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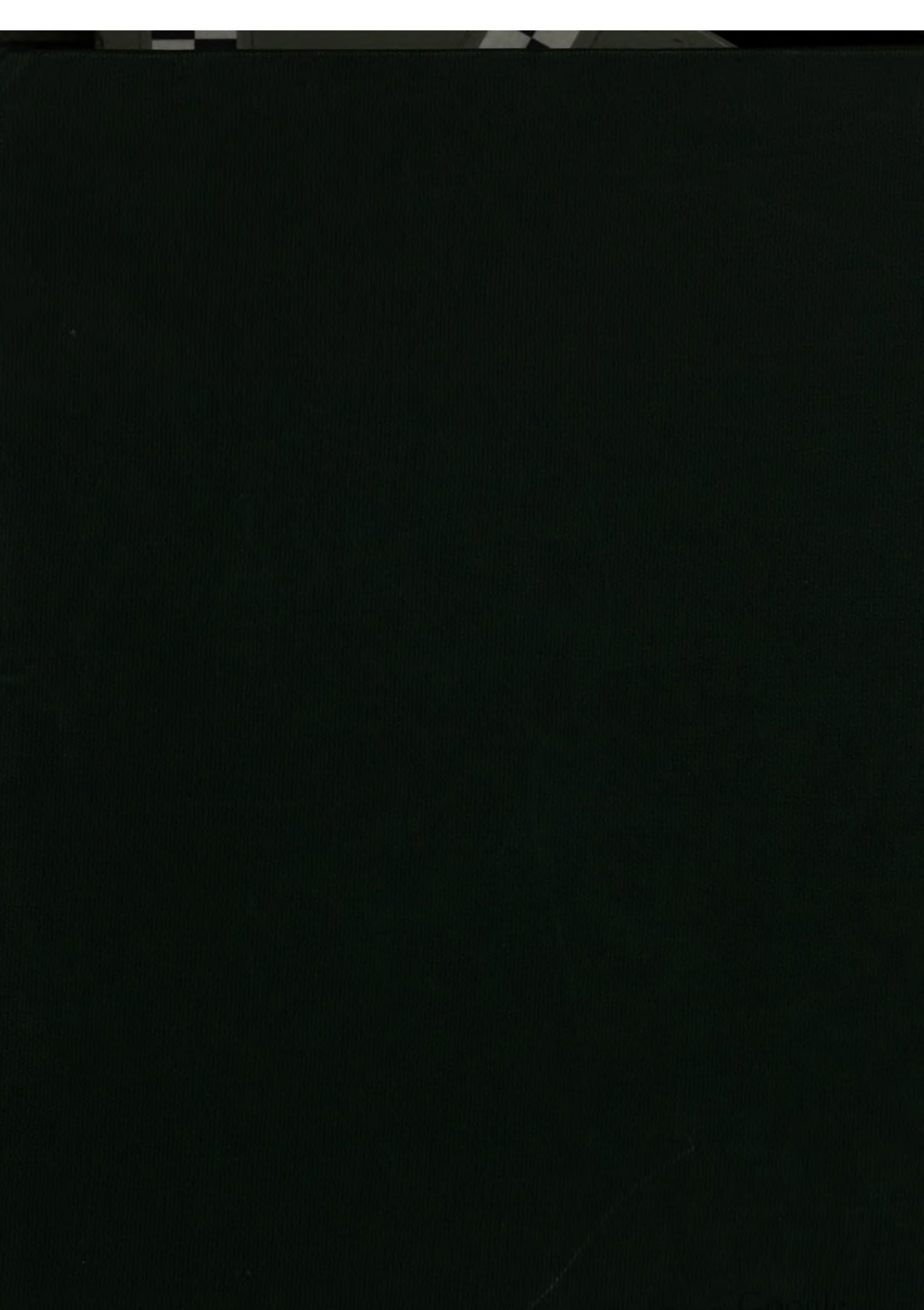
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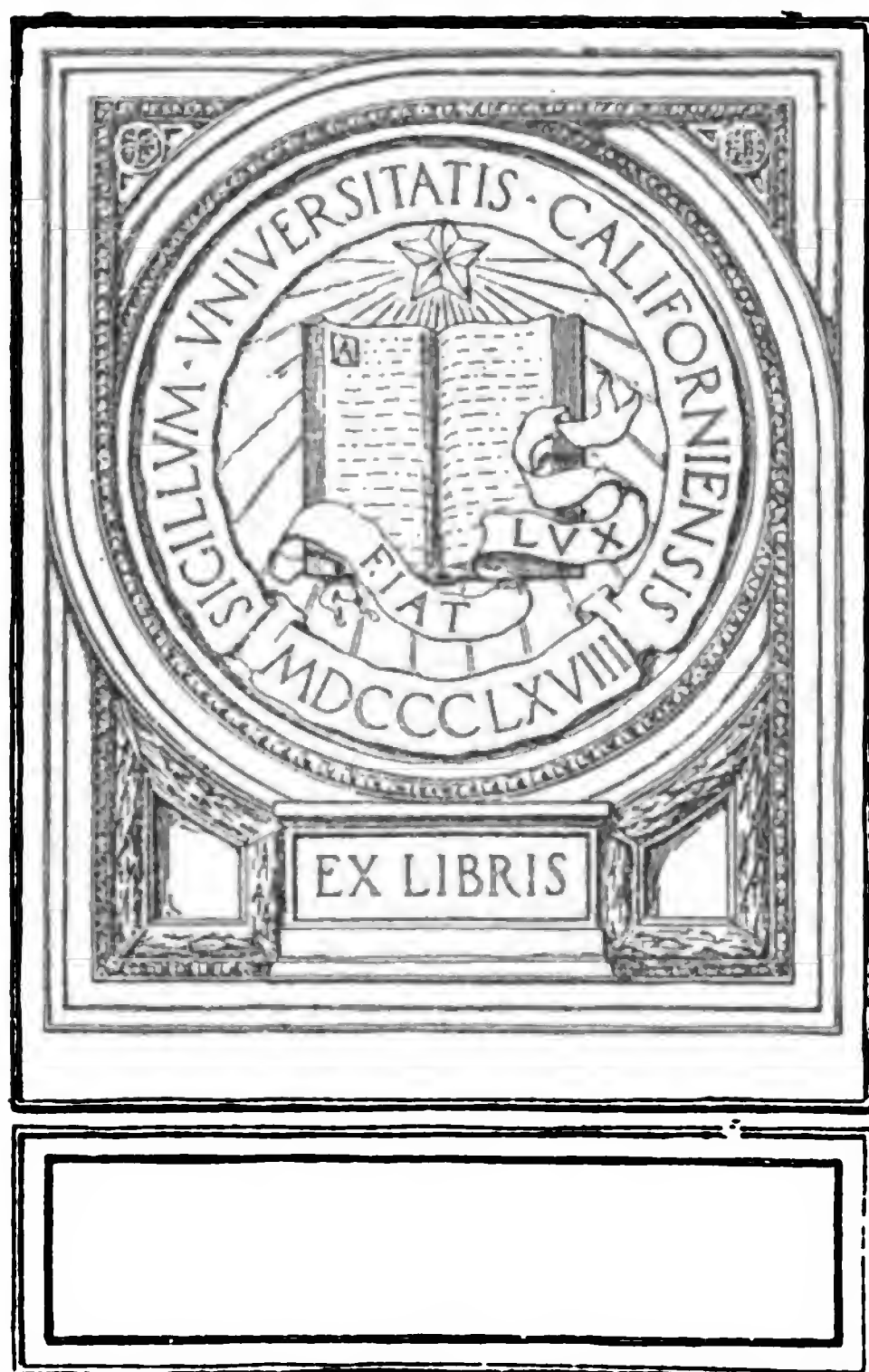
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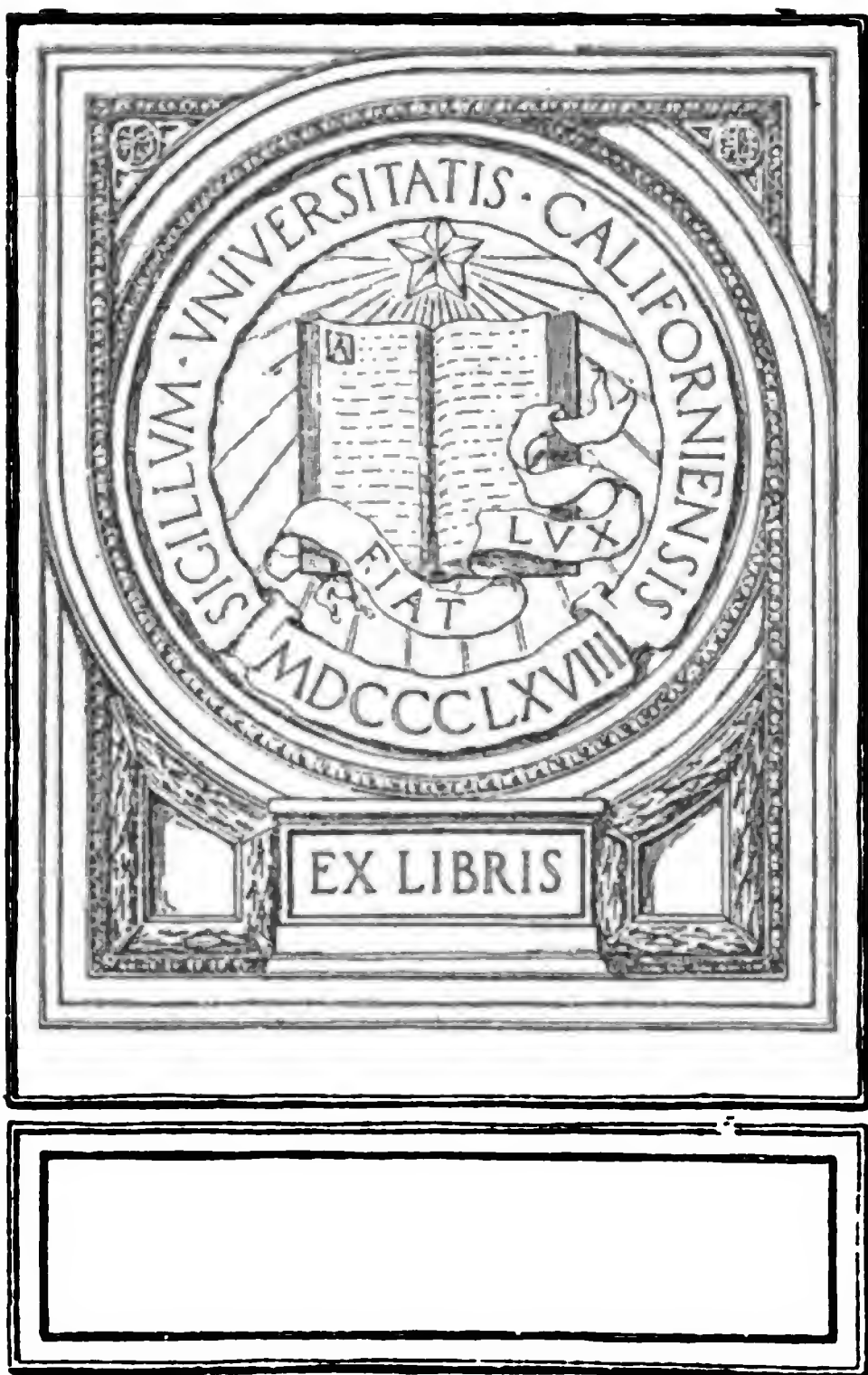
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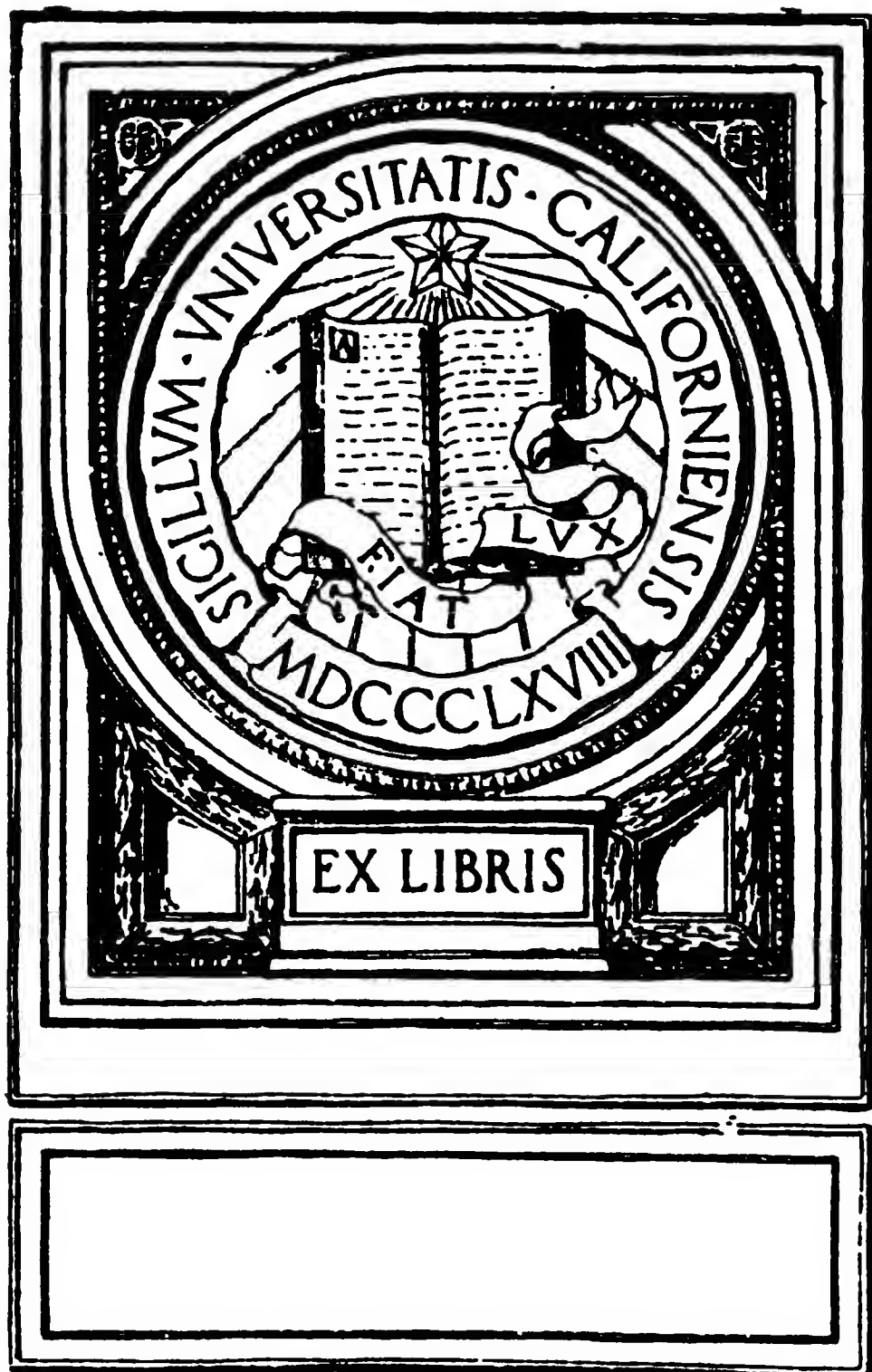
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MOTOR TRUCK

THE NATIONAL AUTHORITY OF POWER HAULAGE

Vol. XII.

PAWTUCKET, R. I., JANUARY, 1921

No. 1



Only Transport Offers These Features

The new Transport lubrication system—automatically caring for over half the lubrication—perfected governing and control, the reduction of friction, positive braking action and numerous other exclusive features give Transport a position of distinct leadership in the truck field. Transport Trucks are winning the market.

TRANSPORT TRUCK COMPANY, Mount Pleasant, Michigan

Builders of "The Frictionless Truck"

Four models for 2000, 3000, 5000 and 7000 lb. service.
Pneumatic tires optional at extra cost on all models.



TRANSPORT

INTERNAL GEAR DRIVE TRUCKS



"The Freight Car of the Highways"

We Want a Responsible Organization to Represent This Truck in New England

There are hundreds of these trucks running in the Middle West and piling up wonderful records for performance and staying qualities, with an absence of service that is almost unbelievable.

TOWER trucks are so well built and give such wonderful service that in Chicago, for instance, where there are a great many TOWERS, every owner of a TOWER has at least two, except two, and these two are owners of but one for their business does not demand more.

WE HAVE NOT ONE SINGLE OWNER OF A TOWER THAT HAS BOUGHT ANY OTHER MAKE OF TRUCK SINCE OWNING HIS FIRST TOWER.

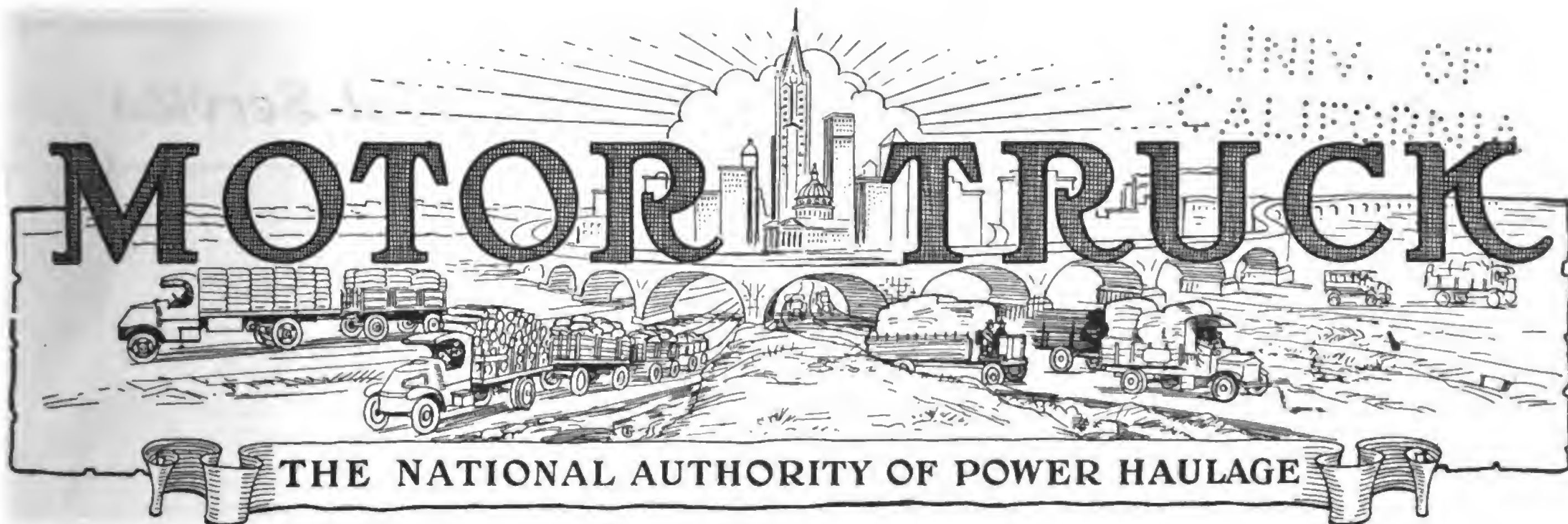
These records can be repeated in any other part of our United States.

Just consider for a moment what it would mean to sell a truck and leave this sale, with all the confidence in the world that when that party was in the market for another truck he would buy a TOWER.

This is the kind of a proposition that we are offering you here and now.

A proposition like this backed by evidence should be proof enough that it should be acted upon at once.

Next month may be too late, for the truck business is going to go off with a "BANG" before you realize it.



VOL. XII. NO. 1.

PAWTUCKET, R. I.

JANUARY, 1921.

MOTOR TRUCK UNRIVALLED IN SHORT HAUL FIELD

**Facts and Figures in Actual Experiences of Owners
in Series of Articles to Demonstrate the Economy
and Efficiency of the Power Vehicle—Data Shows
the Truck Doing Effective Work in Every Line of
Business and Under Every Known Condition.**

THE motor truck is the most efficient hauler of freight up to distances of 50 miles. This is probably true up to 100, but its capacity for the shorter haul is the only claim here made.

The truck is also the most economical carrier up to 50 miles. Railroad and express rates placed alongside of those charged for truck haulage may not always show this. Add on the cost of hauls from terminals, the expense of extra packing and crating and other expenditures **which must be actually made in the operation—not even counting the conveniences and the saving of time—and this truth is apparent.**

The truck goes anywhere at any time without hitching or getting up steam. It works night or day. It is never shunted off onto sidings and left there for days or weeks. When its run is ended the goods are where they were intended for, instead of being under lock and key at a **terminal and not available for days.** The truck starts at the shipping point and goes to the consignee's door. It is the shortest distance between two points.

Yet there are men in industry and commerce who have not yet recognized the superior qualities of the truck in short haul shipping. In the belief that a series of articles showing the efficiency and economy of the motor truck will make a direct appeal to owners

By

Thomas M. Walsh.

and prospective owners and will prove promotive in the merchandising of the power vehicle, MOTOR TRUCK herewith inaugurates such a series.

Truck manufacturers have rallied behind this movement and are giving every possible assistance, for which MOTOR TRUCK is grateful. A word of thanks must also be extended the owners who have furnished facts and figures concerning the operations of their vehicles.

The data to be presented in this series shows trucks in productive work in every stage of American activity. As a distributor of products of the field, forest and factory, in transporting passengers, in public and municipal service, in hauling merchandise, and in speeding up the shipping of all articles that tend to bring prosperity and happiness to the public the truck is depicted playing its vital part

Most of the operations recounted display the prowess of the power hauler under adverse conditions. Climbing into the highlands, delving into the uncharted woodland, negotiating rough roads of every grade, the power of the truck is demonstrated. When this series of articles is concluded it is felt that there will be none left to debate the value of the truck as an efficient and economical distributor of the nation's products.

Saving Money and Time in Municipal Service

THE economy and efficiency of the motor truck in city service is being demonstrated without end. Municipalities are daily awakening to the better service and the cheaper cost of having trucks do the work that is being done now in many cases of man and beast. Yet there are big cities that have hardly begun to motorize. Herein is contained the facts of what Indianapolis, Ind., has saved in time and money and gained in efficiency of one public department through the use of trucks and trailers.

On Oct. 1, 1918, the contract for hauling Indianapolis' ashes expired. The contract had been held by the Indianapolis Hauling Co., which submitted a new bid. Beginning Jan. 1, 1919, it would be worth \$84,000 a year and \$54 an acre for annexed territory to continue the ash hauling work, for a period of five years.

That was the straw that broke the camel's back. The city immediately cast about for a new beast of burden. The result was the purchase of four five-ton White trucks and 25 trailers. This fleet went to work immediately. That was in the winter of 1918-19. Since that time the motor equipment has gone faithfully along, writing itself off the books. During 1919 a total of 115,286 cubic yards of material was collected and hauled to the dumps.

Figuring seven years as the life of the trucks and trailers, the item of depreciation for 1919 was approximately \$8286. Operating costs (including oil, gasoline, tires, repair parts, labor on trucks and trailers) totaled \$12,305. Allowance of six per cent. interest on the balance of the cost of the equipment adds \$2784 to the year's total. Then throwing in a pay roll of \$53,063 the total cost for 1919 amounts to \$76,439, which, on the basis of 115,286 cubic yards of ashes collected, gives approximately 66 1/3 cents as the haulage cost per cubic yard.

Service Extended.

But the real advantage of the motorized and city controlled ash hauling system is not at once apparent in these figures. Recall that the renewal term pro-



This Is Not a Battle Scene—Just a Few of the White Trucks in the Service of Indianapolis, Ind., at the Public Dump.

ferred by the private contractors was not a flat figure of \$84,000, but rather that amount plus \$54 an acre for annexed territory. Since taking over its own ash hauling job the city of Indianapolis has extended its service facilities to a greatly enlarged territory which, had it been annexed under the terms of the tentative new private contract, would have run the expense of that service very close to \$100,000.

Moreover, the city now owns its own equipment and controls its use. Whereas formerly some sections of the city were neglected at times when the weather was inclement, and complaints were accordingly vociferous and vexing, calls and collections are now made regularly, in fair weather and foul, and complaints have consequently been reduced to a negligible number, according to Thomas A. Riley, supervisor of Indianapolis' ash hauling department.

Few Complaints Now.

"We used to have to listen to as high as 200 complaints a day," declared Mr. Riley. "Now, thanks to the day-after-day dependability of the White tractors, complaints average only 10 a day, a truly remarkable record when you consider that we have 70,000 homes to serve and an intricate maze of alleys to thread."

Perhaps the best indication of the complete satisfaction which motor equipment has given is the authorization made recently by the board of public works and City Purchasing Agent Dwight S. Ritter for the purchase of two additional White five-ton trucks and a half dozen more trailers.

The old trucks are all in good shape to face their third winter and promise to go on indefinitely, according to Mr. Ritter, who characterizes the showing they have made thus far as "an unanswerable argument in favor of the motor method of collection. 'I honestly believe that nothing but a White could have pulled out of some of the places we encountered the first year, and come back for more punishment,'" opined Mr. Ritter.

Lost Time Minimized.

The Indianapolis method of ash collection is as follows: Horses, hauling trailers, wend through given alley routes collecting ashes from house to house. The loaded trailers are then left at predetermined street locations, where empty trailers are waiting. The horses are hitched to the empties and lose no time getting out in quest of new loads. Meanwhile White tractors, on their way to the ash dumps, couple the loaded trailers which have been abandoned at the street corners to their trains and continue on their respective journeys.

A trailer will hold four cubic yards of ashes. Each tractor pulls a train of three trailers, making six round trips in a day. The entire fleet of four trucks and 24 trailers thus hauls 288 cubic yards of ashes daily. One cubic yard will weigh between 1100 and 1200 pounds.

One of the outstanding features of the motor equipment is its flexibility, according to Mr. Ritter. The equipment is frequently diverted from ash hauling to snow cleaning duties. During an intensive three weeks' spring time clean up campaign 15,000 cubic yards of refuse were hauled. Every Saturday evening 35 trailer loads of refuse are hauled away from the city market place.

When a fire at the loading platform created an emergency in the garage haul-



White Truck and Trailers Used by Indianapolis, Ind., Shown in the Act of Easily Negotiating a Curve.

ing department the Whites again came to the rescue and so impressively as to precipitate a well defined agitation for the motorization of that department. Customarily garbage collections are made by 35 wagons which haul their loads to the loading platform in the central part of the city. These cranes deposit the boxes on flat cars, 20 boxes to the car. Three cars are required to haul a day's collection of garbage to the city owned reduction plant, located about four miles from the loading platform.

Wagon hauls range from a few blocks up to five miles. One wagon will average three loads a day. During the three weeks that the White trucks played the rescue role they sliced practically in half the hauling expense in the garbage department. One truck proved to be the equivalent of three wagons and it was found that a truck could be located in an hour and one-half. Thus a single truck accomplished in an hour and one-half the equivalent of a day's work for a horse. Moreover, the trucks traveled all

the way to the reduction plant outside the city instead of only to the loading platform.

"If the garbage collection department is ever completely motorized we can eliminate the railroad spur from the loading platform to the reduction plant and even the loading platform itself," asserted Mr. Riley. "Each is quite a considerable item of expense."

Between 90 and 100 tons of garbage are collected daily in Indianapolis. Every requirement is met by the trucks.

Truck Replaces Five Teams and 11 Men

The Wilson Co., Chicago, operates a fleet of Available trucks. One of its 3½-ton trucks is exclusively an ice truck, that is, it hauls nothing but ice the year round. In the summer months this truck keeps a crew of seven men busy. One man drives the truck, another cuts the ice and the other five men carry the ice to the homes. This truck is used principally for family trade. It has replaced five teams and 11 men. It covers a route of 33 blocks twice daily and three times on Saturdays, and makes a stop every 50 feet, which is the hardest test a truck can be put to.

Often this truck is forced to carry seven tons, twice its capacity, and does it without a whimper. An average day's hauling of 44 tons is nothing for this burden carrier, and it has done this hauling day after day for three years. During these three years, day in and day out, winter and summer, it has been in use, the only repairs made on this truck were tightening of the bearings and replacing of the wheels. It covers an average of over 60 miles per day, exclusive of its regular route of 33 blocks.

This monster for work is called upon to start moving at 1:30 a. m. and is kept continuously on the go until 9 p. m. a few months during the year. During this particularly busy period its motor never stops. It is kept running from the time it starts until 6:30 p. m., when it stops for breakfast. Then it is kept running until noon, when a stop is made for dinner. Then it is run until 5:30, when a stop is made for supper. Again it is made to work until 9 p. m.

It is very economical on gas, for it rarely consumes more than 7 gallons of gasoline per day. In the winter months it is kept busy from 7 a. m. until 5 p. m.

The record of one of these 3½-ton Available trucks in service between Milwaukee and Chicago was recently kept during 14 days of actual operation and showed a total mileage of 2806, better than 200 miles a day. Eight miles were traveled on each gallon of gas and 180 on each gallon of oil. An average speed of 16.66 miles per hour was maintained. A total of 122,100 pounds was carried during the period.

The total cost was \$405.47, an average of \$135 per week. This included depreciation, interest and other overhead. The average cost per mile was \$.1442 and per ton mile \$.06791. The cost of shipping

by railroad freight would be \$457.87, which shows a saving of \$52.40 in addition to the days saved in delivery, the benefits of direct delivery and a host of other advantageous features.

P. O. DEPARTMENT SEEKS MORE TRUCKS.

In his annual report Postmaster General Burleson calls for more trucks for his department, which is now operating 2606 in 163 cities. The department is a little better than half motorized and he urges that nothing but motor vehicles be used. The government recently acquired a plant in which its own truck bodies are being manufactured.

Carriers report that they can do twice the work in quicker time. Many of them have saved money personally by moving to the outlying district, reducing rent or taxes.

The National Automobile Chamber of Commerce recently conducted a survey which showed the average experience of carriers to be as follows: Annual mileage, 7434; annual mileage in business, 5880; per cent. mileage in business, 79; increase in business due to use of car, 48

per cent.; per cent. of carriers improving living conditions by use of car, 33.

TRUCK AND TRAILER FORM STURDY HAULING COMBINATION.

Trucks and trailers form a combination that beats all the king's horses and the famous 20-mule team all to tatters. At the close of the recent motor boat show in New York crowds watched a truck and trailer glide off with a boat 100 feet in length. This same combination recently moved a 41,000-pound girder in San Francisco, the girder being 60 feet long and 52 inches high.

BIG TRUCK'S RECORD.

According to a letter written by the owner to the factory, a motor truck owned by Theodore F. Baxter of 930 22nd street, Detroit, has traveled 16,565 miles since Feb. 17, 1920, averaging approximately 100 miles on between 17 and 20 gallons of gasoline, and from 2½ to three quarts of oil per 100 miles. The record was made over all kinds of roads with a United States truck carrying an average load of from seven to eight tons.



Available 3½-Ton Truck Which Works Long Hours Overloaded and Makes Fine Record for Wilson Co., Chicago.

Truck Delivers 200 Tons of Coal in Four Hours



Garford Six-Ton Truck Which Shows Wonderful Economy in Coal Delivery, Chicago.

George K. Spofford, a Chicago cartage contractor, scoffs at the supposition that horses are best for short city hauls. Mr. Spofford has facts and figures to back up his belief in this line. One of his performances that stands out and stoutly supports his claim was the recent delivery of 200 tons of coal in four hours. This was done with a six-ton Garford.

Mr. Spofford's cost figures show 66 per cent. more trips for a truck, a 50 per cent. greater load, 150 per cent. greater tonnage, 66 per cent. more mileage and a 31 per cent. lower ton cost.

Although the daily operating cost of the truck is 72 per cent. higher than that of a team, this figure is offset many times over by the gain in speed, capacity, range and lower ton cost.

Mr. Spofford, who has a hauling contract for three years with the W. G. Davis Coal & Coke Co. of Oak Park, has kept a rigid account of his operation costs. He has found the truck far superior to teams and wagons. His average hauling cost is only 69 cents per ton.

As most of his deliveries are in Oak Park, Mr. Spofford's hauls are short, averaging five trips and 22 miles a day. While this is a low mileage, the speed of each of his fleet of Garfords when running and the quick delivery possible enable him to make five nine-ton trips a day. In emergencies he has hauled 11 tons with a six-ton truck. With a team of horses the best he could do would be three six-ton trips a day.

The remarkable performance of delivering 200 tons of coal in four hours was naturally done under ideal loading, running and dumping conditions. Nevertheless it required perfect performance on the part of the Garford truck. In this connection Mr. Spofford says: "Each round trip was a trifle over two blocks. I made $5\frac{1}{2}$ trips per hour, or a round trip every 11 minutes. I was hauling approximately nine tons at a load, or a to-

tal of 50 tons per hour, at a ton cost of but 6.8 cents."

"Most people would say that horse teams should be used for a one-block haul," he continued, "but if I can use my dump body for delivering I can make the shortest haul cheaper with my truck than with a team. To handle a six-ton load a team would require a helper as well as a driver, against the two helpers and a driver for the truck's nine-ton load."

"For retail coal delivery," Mr. Spofford said, "my Garfords have several distinct advantages. When delivering in alleys or out of the way places, or when being operated at loading chutes, they can be maneuvered splendidly and their sturdy construction relieves the strain of being thrown in tilted positions when the dump body works."

TRAVELING SALESMAN CAN GET SERVICE FROM THE TRUCK

Many concerns are beginning to realize that specially designed trucks are what the doctor ordered for their traveling salesmen. H. G. Dustman, southeastern district sales manager for the Stoughton Wagon Co., recently had a Stoughton truck rigged up for himself and wife and travels in state. They travel, eat, sleep and work in this vehicle. A complete office set, including filing cabinet and typewriter is carried. The operations of this truck up to Dec. 1, follow:

Mileage to Date.

One thousand eight hundred and fifty-two miles covered to date. Some very bad roads and some of them very good.

Condition of Tires.

Fine. There is not a scratch on any of them.

Punctures.

One. Had one puncture in the right front tire, caused by a small nail. I repaired this one night.

Repairs.

None. There has been no repairs made to the truck in any shape or form.

Condition of Body.

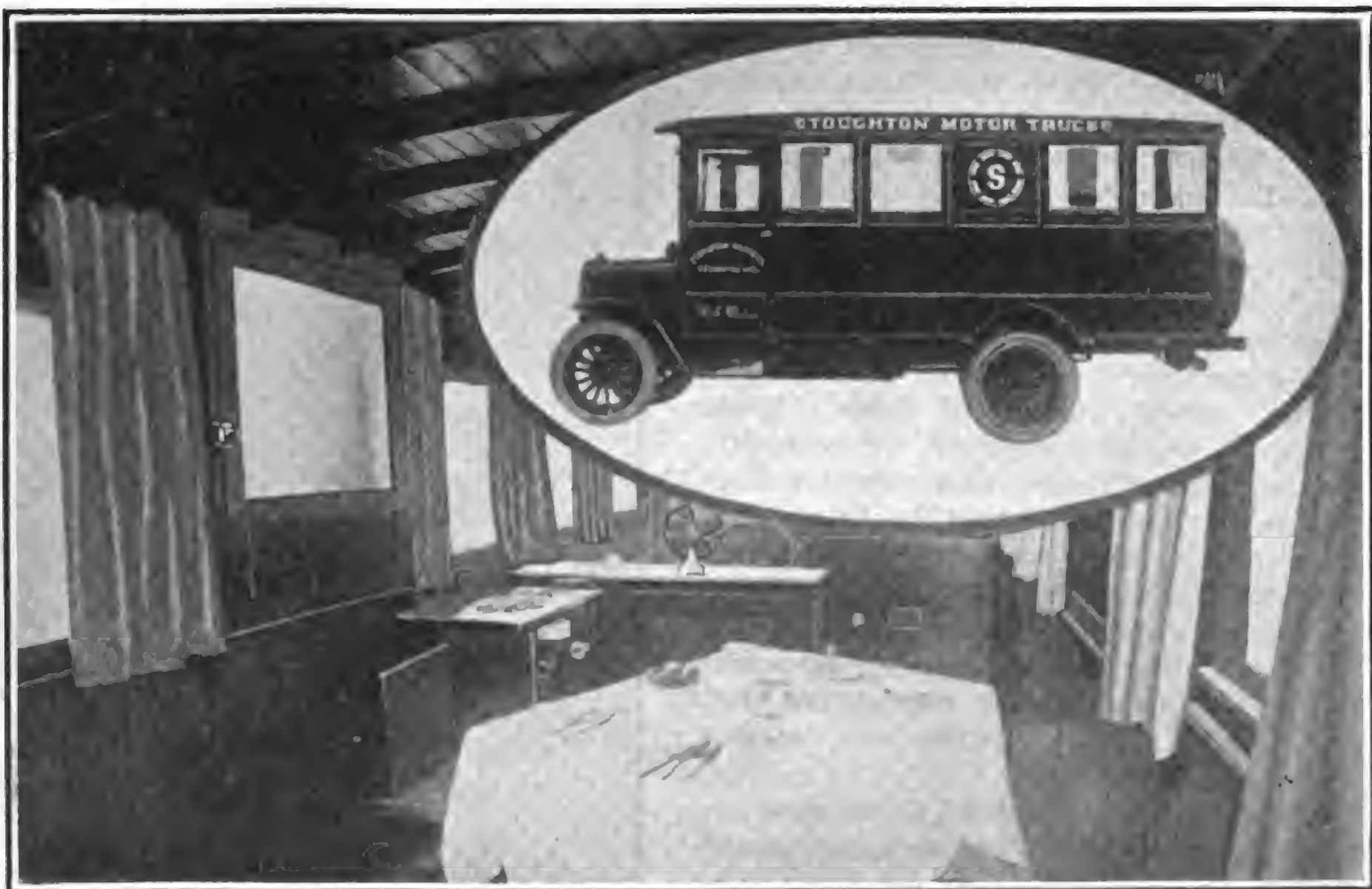
Good. I think the body is in fine condition, considering the twists and strains it has had. There is one check in the right side from the door back about a foot in the lower panel. One in the same panel, from wheel house back about two feet. Sides are some scratched up by driving through the brush.

Motor.

Fine. The motor is as quiet as when we left the factory.

Rear Axle.

Fine. Have changed the oil in it once.



Attractive Home and Office of the Stoughton Wagon Co.'s Southeastern Sales Representative.

Bankers Recognize Truck As National Asset

The motor truck is given its proper status in the nation's transportation scheme in an authoritative article in the December number of the *Commerce Monthly*, the official publication of the National Bank of Commerce, New York city.

Among other interesting statements, the article says:

"Motor carriage of freight and passengers now occupies an assured place in the American transportation system. It is true that the conditions of competition influencing the development of motor transportation at present are radically different from those which stimulated the rapid increase in the use of trucks during the war. Except for perishable goods time is no longer the chief consideration. The established transportation systems will eventually adjust their facilities to accommodate the traffic for which they are best adapted, so that the motor truck must bid for business on the basis of efficiency alone. There is now no doubt that truck transportation will successfully meet this test.

"Trucks are still carrying a considerable amount of freight which formerly went by rail, and it is probable that they will take more of this business in the future: but it is no longer to be feared that the railroads will be injured by this diversion of traffic. As the railroads adapt themselves to the increased post-war traffic, the use of motor trucks will be confined to the field in which their superiority can be demonstrated. Manufacturers who make deliveries by both truck and rail find that beyond a certain limit of distance the advantage of the railroad is decisive. This limit is proportionate to the railway terminal costs of the locality. In a region of very high terminal costs it has been estimated at about 125 miles. With the exception of shipments of goods for unusually fast delivery it does not pay to ship by truck beyond this distance when railroad operation is normal. On the other hand, for shipments of 50 miles or less the advantage is all with the truck, except for the heaviest type of loose freight, and

the recent railroad rate increases will accentuate this advantage.

Where Railroads Fail.

"Railroad rates for short hauls are inadequate to meet the high proportion of terminal expense involved. Short haul freight in less than carload lots contributes nothing toward overhead expenses or profit and may even cause serious losses by increasing terminal congestion. Motor truck competition relieves this congestion and ceases to be effective at just about the point where the really profitable railroad business begins. Experience in England confirms the fact that the diversion of short haul freight to motor trucks tends to benefit both the railroads and the trading community.

"Motor trucks are valuable supplements to railroad systems when operating as feeder lines, and in that capacity may replace expensive light branch lines formerly found necessary to supply main line business from outlying territory.

"The railroads themselves recognize the advantages accruing to them from improved highway construction and in many cases are throwing their influence in favor of improved road construction.

It has been suggested that truck lines be established as part of the railroad system so that a country shipper may load his goods on a truck at his nearest village and receive a through bill of lading to final destination with a single freight charge. Such a development is not improbable.

Builder of New Business.

"The motor truck operates with success in districts formerly handicapped by inadequate transportation facilities and here performs available service in creating new business. Motor express lines, privately owned and operated as public carriers, radiate from nearly all large metropolitan centers. Through these truck lines the farmer can sell his product without loss of time and at a minimum of expense, and is often enabled to serve markets heretofore quite out of reach. Such marketing methods appear as the best solution of the difficult problem of supplying great cities with perishable foodstuffs, as it gives the city access to producing areas within a wide radius, many of which enjoy no other means of transportation, or at best

(Continued on Page 6.)

Trucks Economical in Bus Service

Trucks are saving money to owners in the transportation of passengers as well as freight. Omnibuses are slowly but steadily and surely proving their utility. The right truck, properly operated and maintained, is an economical factor in passenger transportation. It must be backed by right management of the business.

The Fay Motor Bus Co., Rockford, Ill., operates 50 Reo Speed Wagon buses on various lines in and around Rockford. Recently the concern computed cost figures on 26 of these busses which had been in operation every day of the month.

Their total mileage was 50,902. Operating expenses, mechanical repairs, gasoline, oil, tires and other incidentals cost one half cent per mile. The driver's

wages amounted to four and one-third cents per mile. Overhead was three and one-tenth cents per mile and depreciation one and three-ninths cents per mile. The total cost per mile was 14 1/30 cents.

Gross earnings were 21 9/10 cents per mile, giving a net profit per mile of 7 13/15 cents. The net profit on all 26 busses was \$3909.58 for the one month alone.

The following figures are based on the actual cost records of Speed Wagon busses operated in Newark, N. J.

Gasoline, oil, tires, grease, insurance, repairs, interest and depreciation, for one year, \$2576.60. This does not include garage charge and driver's wages.

The distance run averaged 45,000 miles and the average income was \$7500.



Part of Fleet of 50 Reo Speed Wagon Buses Which Serves the Public Efficiently at Rockford, Ill.

(Continued from Page 5.)

slow and expensive facilities, which discourage the daily shipment of perishable freight. The city merchant is brought into closer touch with his suburban markets.

"In passenger carriage for public service the motor vehicle encounters the active opposition of electric railways. The outcome is not yet apparent, for the proper division of the field can come about only through free competition, and this unfortunately is not the situation where franchises are granted and rates fixed. The trolley car and the omnibus have distinctive qualities, however, which recommend each for particular types of service.

Flexibility of the Bus.

"It is generally recognized that with the advantages of rail traction and centralized power supply, the trolley car is the more efficient for heavy traffic over comparatively long distances. The great advantage of the omnibus line may change its route when necessary without suffering a loss: special routes may be followed on Sundays and holidays without additional installation. The capacity of the thoroughfare is not reduced by the operation of omnibuses as it is by the laying of car tracks. Omnibuses are unquestionably superior for special irregular traffic, as feeders to the electric lines and in trying out new regions. They have operated with great success as supplements to street car and subway systems and have proved to be valuable and popular instruments of transportation. Where car tracks do not already exist the qualifications of the motor bus should be carefully considered.

9000 Buses in New York.

"The extent of the use of omnibuses in the United States is indicated by the fact that more than 9000 are registered in New York city alone.

"Although service as a public carrier is perhaps the most interesting function of the motor truck, it is relatively unimportant as compared to service in private use. Figures for the distribution of motor trucks in the United States by industries on Jan. 1, 1918, show that of approximately half the registered trucks whose ownership could be traced, only seven per cent. were used as public carriers. Farmers are now the largest users of trucks in this country, as they own 10 per cent. more than manufacturers and 15 per cent. more than retailers."

TRUCKS HELP SPREAD EDUCATION OVER EXTENDED AREA

Motor trucks are rapidly disposing of the biggest problem in connection with the establishment of consolidated schools. The cost of transportation is always the leading argument against these harbingers of culture in sparsely settled districts.

The Bessemer Motor Truck Co., Grove City, Pa., presents a concrete case in which the cost was nominal and the results most gratifying. The fleet of five handsome busses shown in the accompanying cut were furnished by this organization to the Ault Consolidated School District, Ault, Col.

The Ault Advertiser, in its issue of Dec. 3, 1920, tells of their operations as follows:

"These five large Bessemer school busses transport daily 250 children from their homes in the country to the central school building. Each truck carries 50 pupils on a trip and is equipped with every modern convenience for the comfort and safety of the children. Careful and competent drivers operate these trucks on an accurate time schedule under a strict set of rules and regulations.

"Transportation is the biggest problem of consolidated schools and the principal objection used against it is 'It costs too much.' Accurate figures kept for the first three months of operation disproves this argument.

"The total operating expenses for all the trucks per month, including gas, oil and drivers' salaries amounted to \$250. This amount divided by 250, the number of children hauled per day, is \$1, the monthly cost of transportation for each pupil. Since there are 20 school days in a month the daily cost is five cents per child. The above figures are for operation only and do not include depreciation."

GASOLINE PRODUCTION.

Gasoline production in the United States for 1920 is estimated at 110,000,000 barrels, an increase of 16,000,000 over 1919 and 450 per cent. over 1911. The domestic crude oil output increased from 220,000,000 barrels in 1911 to 450,000,000 (estimated) in 1920.

HEATED CABS ON MANY TRUCKS AT NEW YORK SHOW.

A large number of the leading trucks exhibited at the New York show were equipped with compact heating devices in the cabs. This is in line with a very widespread tendency to afford the drivers and crews of lorries as much comfort as possible.

Truck manufacturers are thus making an occupation which has been more or less unattractive to the better classes of mechanics and drivers, far more desirable. The almost unskilled laborers that have heretofore in many cases found their way into this field, to the detriment of valuable machinery equipment, will discover that more capable operators are taking their places, and will be forced to prepare themselves thoroughly for their work, or to step aside.

The motor truck is fast becoming an efficient all-year-round commercial vehicle, just as the passenger car has been made into a comfortable 12-month convenience.

A number of trucks at the show were fitted with the "DWS" type of "Perfection" heaters, the utility of which is generally recognized.

TRUCKS BRING SCHOOL CHILDREN 100 MILES DAILY.

A school at Fort Stockton, Tex., serves a district that is 100 miles one way and 70 another. Four motor trucks bring the children to school from the ranches and other outlying points. They run on schedule over regular routes. The teachers maintain that the long rides keep the youngsters in splendid physical and mental condition.

MAXWELL-CHALMERS MERGER.

Announcement is made by the managing and reorganization committee of the Maxwell Motor Co., Inc., and the Chalmers Motor Corporation, that the reorganization and merger plan of Sept. 1, 1920, has become operative. The combined companies are now in a strong financial position. The time in which deposits of stock and unsecured notes and claims can be made without penalty has been extended to Feb. 1.

The Hood Motor Co., Monroe, Mich., plans to begin production on Hood motor trucks about April 1.



Fleet of Bessemer Buses Which Bring 250 Children Many Miles to School Daily in Colorado.

Building for the Morrow

The new year, fateful to the automotive industry, is here and to the men who can X-ray the trend of business it brings a message of good cheer. The doors of car and truck factories have reopened. The money stringency is less taut. Wages and prices in many lines have reached rock bottom. The stock market has taken on a firmer tone. Motor stocks are on their way upward. There has been a sharp rally in the sterling exchange rate. Liquidation is being made in volume. General business is on an ascending scale. The motor shows, recognized trade builders, are here.

To the motor truck industry the year will not only be fateful, but fruitful. Lack of production was the nation's bugaboo in the early stages of last year. Economical distribution will be the issue in 1921. The industry is ready to tackle this problem, and master it.

An output of 335,000 trucks in 1920 does not show over-production. The 30,000 manufactured beyond the figures of 1919 were smaller vehicles. Despite the growing recognition of heavy duty truck utility there was practically no increase in production. This means that when the strong call for heavy duty trucks comes in the early spring there will not be an over supply.

The truck market is going to benefit mightily from construction of every nature delayed for months and, in some instances, for years. Spring marks the time when this work must be done. The railroads are going to spend a billion dollars. Many hundreds of millions are to be spent on highways. Public buildings, municipal work of all kinds, hotels and residences, are to be constructed. These mean hundreds of more millions. They all spell work for the motor truck.

Loss of confidence by the public has been the lever which toppled the house of cards wherein business had such a free and easy play last year. This same confidence must be regained by the truck manufacturer and dealer to bring back what has been lost.

Some manufacturers and many dealers do not seem to own a single ounce of this ingredient. The manufacturer passes his mood along to the dealer, the dealer hands it to the salesman and the latter often distributes it to prospects, some of whom might otherwise have bought trucks.

The manufacturer and all in his fold must have faith in their product and their industry to fan into flame the apparently dying embers of business, which, in truth, are but smouldering. The truck maker who cannot vision a prosperous future should shut up shop instantly.

The manufacturer who wants his share of trade when the tide turns cannot delay a day. There must be no skidding once the road is open. To get anywhere the manufacturer must be under way now. Production and distribution plans need revising. With the worst over refinancing may be given closer study. Every unit of the organization should be oiled and ready to do its part when the machine goes into high.

While making ready for a full return of business to normal many manufacturers are building their own markets. They are doing this through distributors, driving home methods of grasping every opportunity opened through new avenues of industry and commerce.

The building of every road means more than the use of motor trucks for the construction work. It means that farmers and others living along that highway will be truck prospects. It means a new route for a motor express line and for omnibus service. The live distributor will study these conditions. If he can show some one where an express or bus line can be operated at a profit there is business in it for him.

With industry hitting its stride again salesmen will find many mill owners who do not care to buy a truck, but are ready to give out a contract for hauling by the week, month or year, or enough by the job to keep a truck going for months. With one of these contracts to offer a prospect a truck is as good as sold.

The manufacturer who is going to reap the harvest is now beginning to build—trucks and policies.

SIGNS THAT MARK COMING OF RAINBOW



John F. Bowman, Vice President Garford Motor Truck Co.

BOWMAN AN OPTOMIST.

J. F. Bowman, general sales manager of the Garford Motor Truck Co., Lima, O., calls attention to the fact that it took 13 years for prices to come back to where they started after the Civil war. Mr. Bowman simply draws this parallel as a text for a few general remarks of a cheery nature regarding the outlook in the automotive industry. He points to the latent buying power of the country, the relaxation of the credit strain, the way labor is taking the transition and the evaporation of radicalism as signs that point to early and profuse prosperity.

N. A. C. C. DINNER.

Francis H. Sisson, vice president of the Guaranty Trust Co., made a plea for optimistic leadership and predicted a healthy future for the industry in the feature address at the annual dinner of the National Automobile Chamber of Commerce, held at the Hotel Commodore, New York city, Jan. 11. There were 700 members present, including nearly every manufacturer in the organization.

TIMKEN DETROIT DIVIDEND.

Timken Detroit Axle Co. declared a dividend of two per cent. on common, payable Jan. 15 to holders of record Jan. 10. The directors also declared a seven per cent. cash dividend on preferred, payable in quarterly installments of 1¾ per cent. each on March 1, June 1, Sept. 1 and Dec. 1, to holders of record 10 days prior to the distribution dates.

BONUS TO NORTHWAY HELP.

The Northway Motors Corporation, Natick, Mass., recently gave a stock bonus of about \$6000 to its employees.

FACTORIES BUSY AGAIN.

The Acme, Commerce, International Harvester, Nash, Packard, Page-Detroit and Traffic organizations have resumed truck manufacturing, all on good sized schedules and some in full. Continental Motors and many automobile concerns have resumed operations. The White Co. continues to operate with its full day force of 6500 hands. The Grant Motor Car Corporation has increased production.

MORE TIRES TO BE USED THIS YEAR THAN LAST SAYS COLONEL COLT

Col. S. P. Colt, chairman of the board of directors of the United States Rubber Co., recently voiced the following opinion as to the future of the tire industry:

"Those who take a despondent view of the tire business for 1921, I feel, fail to realize the large proportion of automobiles that are used for business purposes and the relatively small number for pleasure. The latter may be largely curtailed and doubtless will be, but the former are a necessity, and with the development of our highways, now in progress, are bound, in my opinion, to steadily increase.

"To meet hard times one may wear their old clothes for several years, but they cannot run their automobiles or auto trucks on bare wheels and, therefore, must either abandon them or purchase tires. I would predict that there will be more tires consumed in the year 1921 than there were in 1920 or in any previous year in the history of the world."



J. A. Young, Vice President and General Manager, Dunkirk Axle Corporation.



R. Jackson Jones, Traffic Co., European Representative.

BIG EUROPEAN MARKET.

R. Jackson Jones, European representative of the Traffic Motor Truck Corporation, St. Louis, Mo., is home and he brings a message that will be glad news to the industry. It is to the effect that the European market for trucks is enormous and that people overseas are "sold" on American trucks through those left behind by the various armies. Mr. Jones makes his headquarters in London, but has recently traveled through Norway, Sweden, Denmark, Germany, Holland, Belgium, France, Spain and the British Isles. Everywhere the American truck is highly regarded.

The English distributor of Traffic trucks has been enjoying such a nice volume of business that he has by reason of his sales and deliveries of Traffic trucks been able to lead all other distributors in the Traffic truck organization.

FORM DUNKIRK AXLE CORP.

The Dunkirk Axle Corporation has been organized to take over the Empire Axle Co., Dunkirk, N. Y., which recently went into voluntary bankruptcy. The new corporation was formed by interests connected with the Watson Products Corporation, Canastota, N. Y. Quantity production is looked for by spring. The officers are: President, A. A. Keesler; vice president and general manager, James A. Young; secretary-treasurer, William A. Poad. Manager Young is a former executive of the Sheldon Axle & Spring Co.

The Motor and Accessory Manufacturers' association has made a survey among 384 members engaged in the manufacture of parts, units and equipment, and finds a sturdy feeling of optimism over the future of the automotive industry.

DENBY MODEL 33 FOR RAPID HAULING

Announcement is made by the Denby Motor Truck Co., Detroit, Mich., of the addition to its line of a new model, known as model 33, which offers many new and unique features not usually found in trucks of this type. Well known engineering principles have been followed throughout in designing and constructing this truck and departure from usual practice has only been made where it was decided that some other special feature would work to better advantage.

The truck is intended to meet the requirements of those engaged in rapid transportation of medium weight loads. Consideration has been given to accessibility in adjusting the service brake and renewing worn bushings and to minimizing the labor necessary to adjustment and maintenance.

The truck is of sturdy construction, the parts providing a wide margin of safety and many of the fittings being as large as those used on heavier trucks of this make.

Ample Power for Truck Capacity.

In line with the policy of the Denby company, a Red Seal Continental engine is used, similar to that used in other models, the bore and stroke of which is respectively $3\frac{1}{4}$ by five inches, developing at governor speed 35 horsepower, while the S. A. E. rating is $22\frac{1}{2}$.

With the gear ratio provided in the internal gear drive rear axle this amount of power proves ample for all needs.

Final drive is through multiple disc to three speed transmission in unit construction with engine, to propeller shaft, through shaft to bevel gears in differential, to axles and pinion to gear in drum of each wheel. Rear axle is of the internal gear type with the springs fastened to the dead axle and the wheels running on bearings fitted to the dead axle.

The engine is four cylinder, unit power plant suspended at three points, governed by a Monarch governor, fitted with padlock and key and cannot be tampered with. The carburetor is a Stromberg, while ignition is supplied by an Eisemann high-tension, water proof magneto, fitted with impulse starter. The cooling system is thermo syphon, and the radiator is of the built-up type, equipped with cast top and bottom tanks. Speed of the truck is governed at 25 miles per hour.

Special Features.

Special features have been incorporated in this model which makes the parts readily accessible.

For instance, by removing two spring shackle pins and four nuts the rear axle assembly, which includes the springs and wheels, can be entirely removed from under the truck. Consideration has also been given to the use of renewable bushings in all parts of the truck chassis subject to wear, and these bushings are easily removed and replaced with new whenever necessary.

Other improvements include the location of the service brake, which is taken from the rear wheel band and placed on the propeller shaft at the rear of the transmission at the center bearing. This service brake is husky in appearance, of the double acting type and is easily accessible for adjustment by simply turning a thumb screw either up or down, to tighten or loosen the tension on the brake band. This construction removes the necessity of using two brake rods, running the length of the chassis to operate brakes on the wheel drums, and is considered as a great improvement.

Other improvements of striking merit are the especially designed spring clip seats which completely house in the rear springs at the axle, positively preventing any slipping or twisting of springs on the axle pad. This special feature eliminates any danger of the rear axle getting out of line with the other units of the truck.

The length of the frame back of the driver's seat is 120 inches, width 34 inches, body allowance 900 pounds and the wheelbase 136 inches. The tires are cord, 35 by five-inch front and 38 by seven-inch rear, of ample size for the capacity of the truck. The steering gear is located on the left side of the driver's seat, while the gear shift and emergency brake are in the center, at the driver's right. A foot accelerator is provided which works independent of the hand throttle located on the steering wheel, at which place the spark is also located.

Regular equipment includes: Chassis, electric head lamps and dimmers, electric tail lamp, electric horn, electric generator and storage battery, tools, jack and power pump, which are all included in the chassis price of \$2300.

It is planned to get into quantity production immediately and it has been possible to produce a few sample jobs which are already in the hands of dealers. It is anticipated that there will be a heavy demand for this truck from users of this size, and the manufacturer states that he has no hesitancy in recommending it, without reservations for any work that a truck of this capacity should perform. No expense has been spared to fit this truck thoroughly for the work in hand.

STORE DOOR DELIVERY.

The transportation committee of the Federal Highway Council is to put store-door delivery to a determining test in one or more cities. The motor truck and the highway will be used as agencies in conveying freight direct to the door of the consignee and thus prevent the accumulation of tonnage in warehouses, adding to congestion and financial loss. This plan has already been tried in Baltimore with success.

Another movement launched by this committee at its December meeting was the bringing before the American Association of State Highway Officials of the question of snow removal, urging the necessity of getting annual state appropriations for this work, which is rightly regarded as a part of highway maintenance.

TO SHOW ELECTRIC TRUCKS.

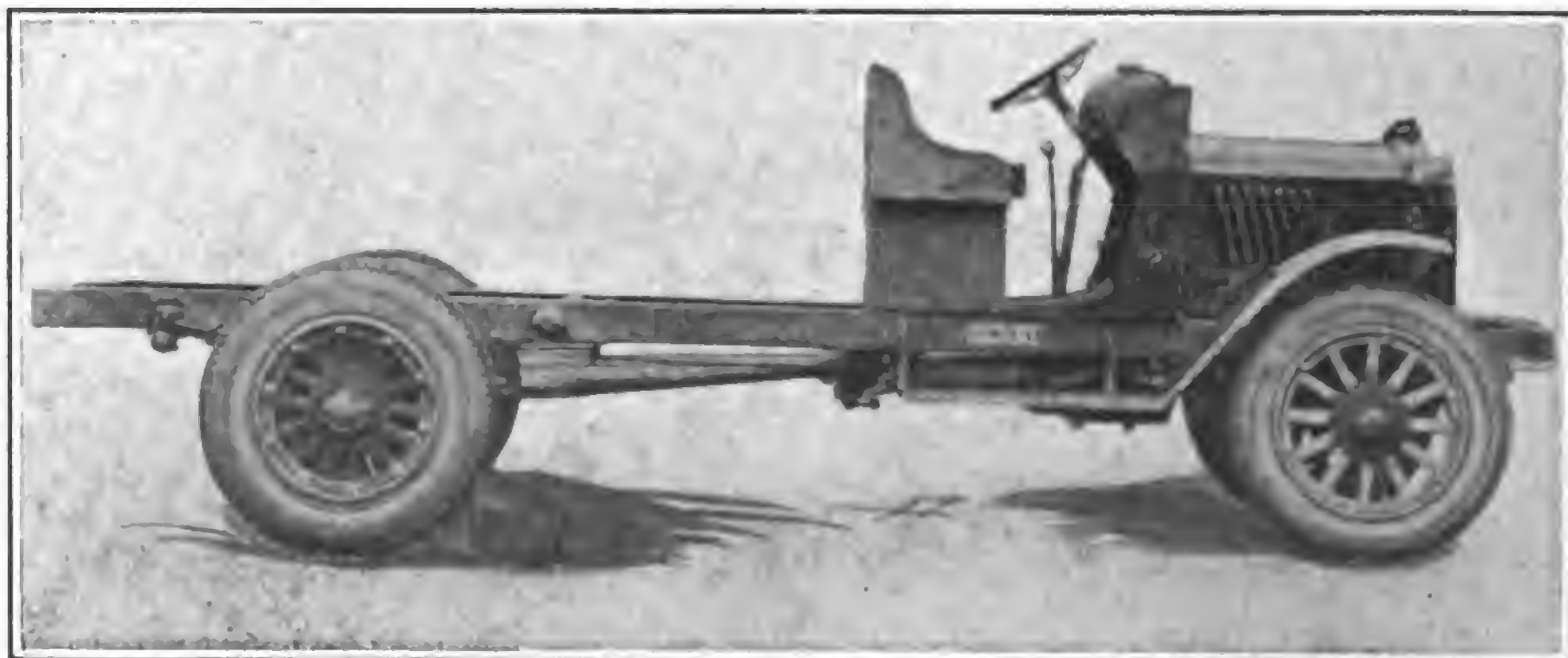
Arrangements are being made for an unusual display of electric motor cars under the auspices of the New York Edison Co., to be held in its big show room at Irving place and 15th street, New York city, and manufacturers of electric trucks, industrial trucks, passenger cars and batteries and accessories are invited to exhibit their products.

Street trucks and passenger cars will be shown during the week of Feb. 5, while industrial trucks will be exhibited the following week. Batteries and other equipment and accessories will be on view during both weeks.

Charles R. Skinner, Jr., of the Automobile Bureau of the New York Edison Co. is in charge of the arrangements.

GMC HAS STEEL INTERESTS.

The General Motor Corporation has acquired a substantial interest in the Penn Seaboard Steel Corporation. A. P. Sloan, Jr., vice president of General Motors, and J. G. Weiss, president of the Hyatt Roller Bearing Co., a subsidiary concern, have been added to the Penn Seaboard's directorate. The Penn Seaboard Steel Corporation is a unit of magnitude, and the connection means much to the GMC.



Denby Model 33, Designed for Speed Work, Which Has Many Special Features.

HANDLING THE PUT-IT-OFF PROSPECT

"Truck prices are going down!"

Most of the sales resistance today is centered in that remark. The dealer and salesman meets it on every hand. It's nothing but a state of mind and can be overcome by equal firmness on the part of the salesman. He should make up his own mind that prices are not going down and talk accordingly.

The man who needs a truck now, **NEEDS IT NOW**, and not six months later when he thinks prices are going to fall. If he has no other defense than the statement that he is waiting for prices to fall he should be rounded up if the right attack is made. The salesman has the edge in knowing that the man is actually in need of the truck.

One telling point in this connection, particularly if the sale is to be on time, is that if the new owner arranges for immediate delivery the truck will have almost paid for itself before the period when he anticipates the price will drop.

This result means more to him than the \$100 or \$150 cut in price that might be saved to him should the unexpected happen and there is a reduction in truck prices this spring.

In addition to bringing in the money to almost pay for itself in the interim the new truck may result in pleased customers, enlarged business and other factors from which many dollars may ultimately grow.

A hint that under production this winter is bound to bring a scarcity of trucks in the spring does no harm. A few facts about the cost of materials entering into power vehicles and the certainty that they will not be appreciably reduced will help. There is the further point that manufacturers who closed down this winter and broke up their organizations would not do so if they could operate on a reduced price scale. The chief argument is that should there be a cut it will not be nearly large enough to compen-

sate for the loss sustained by the man who can find work for a truck the next three or four months and fails to do so.

A dealer the other day lost a sale because he failed to give the right answer to a prospect's statement that a repetition of last winter's snow storm might throw him off his payment schedule. The dealer muffed this one. Instead of agreeing that the note could run an extra month if the conditions of the recent winter were repeated, he rambled on with an opinion that the signs indicated an open winter. Nine dealers out of 10 would not let a prospect get away as easily as this one did during these days of business transition.

One way to meet the prospect's argument that prices will come down is to quote a list of leading truck manufacturers who have guaranteed prices up to May, June and July, 1921. **MOTOR TRUCK** would be glad to furnish such a list to any of its readers.

I. T. C. Self-Loading Industrial Truck Has Durability

An industrial self-loading truck of greatly improved design has recently been placed on the market by the Industrial Truck Co., division of Cowan Truck Co., Holyoke, Mass. The truck is all steel and guaranteed for 5000 pounds capacity, which is 1000 pounds greater than the usual guaranteed load for this type of truck.

It is claimed to have the quickest acting elevating mechanism of any similar truck on the market. It elevates in five seconds when equipped with 28 cells and in six seconds with 21 cells. The lifting mechanism is operated by an independent, heavy duty, series wound motor and worm gear reduction. The platform lifts vertically, the rise being 4½ inches. The platform may be stopped at any point going up or down and it requires only three seconds for full lowering.

The rear end is equipped with a heavy bumper, which effectually takes all shocks, and protects the rear end of the lift platform. The rear end is also equipped with a draw bar attachment, which enables the truck to be used as a light duty tractor. Automatic brake and circuit breaker application, four wheel steer, single reduction worm drive of the power axle and easy accessibility of batteries, lifting, driving and control mechanism are features of the truck. It will operate in intersecting aisles 60 inches wide.

The turning radius extreme outside point is seven feet 10 inches. By folding the foot pedal and steering handle into a vertical position the overall length is shortened for use on elevators. The length is 102 inches overall, or 91½ inches with step raised. The width is 36

inches overall and 51 inches high over steering shaft head. Either alkaline or lead batteries are used. The controller is of the drum type, with three speeds forward and three reverse.

This new truck has been subjected to most rigid tests under every conceivable operating condition, and its all-steel construction, low center of gravity and general compactness and ruggedness have amply demonstrated that it will be capable of enduring service.

TRUCK ASSOCIATION ELECTION.

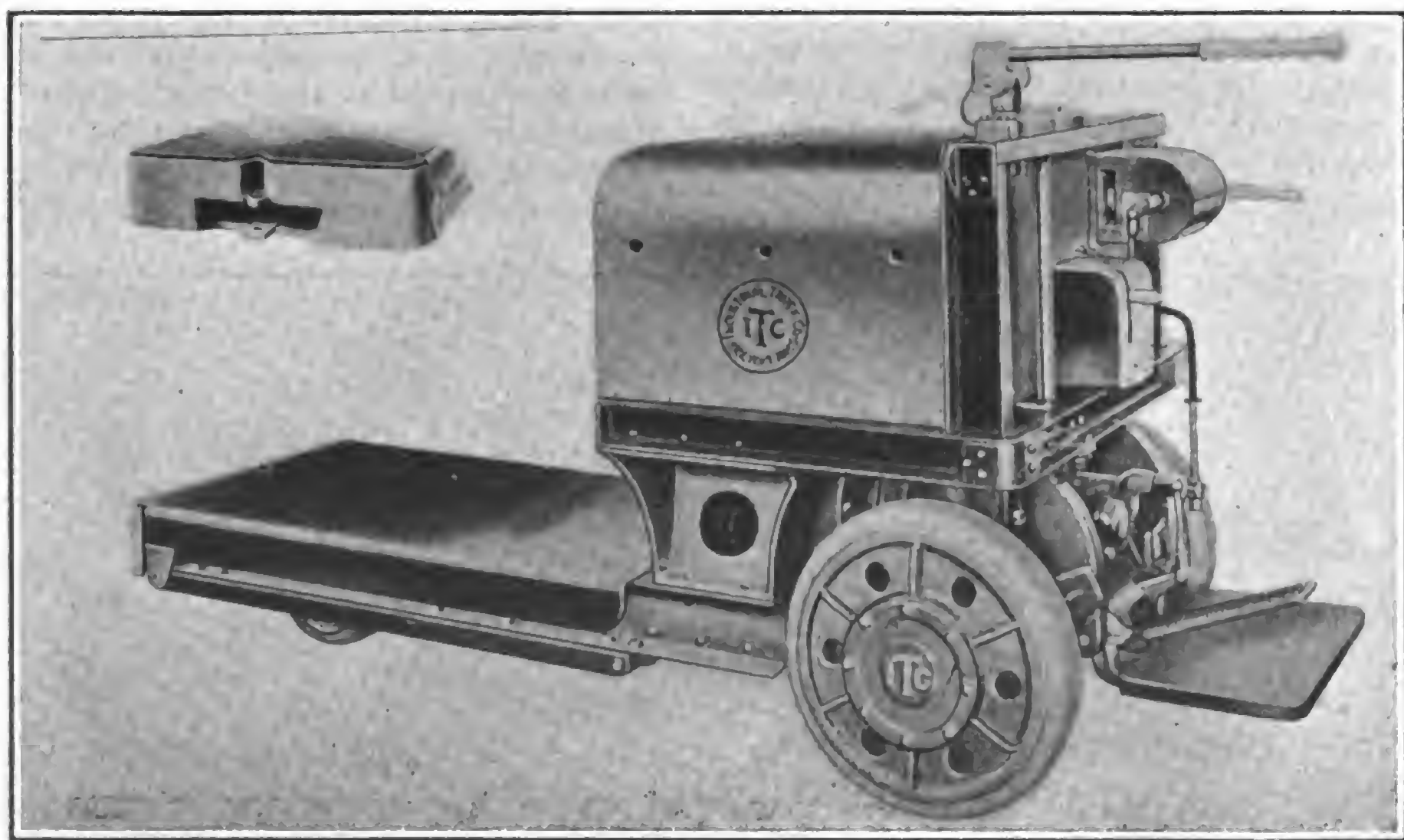
The Motor Truck Association of America elected the following officers at its December meeting: President, L. E. Campbell; first vice president, John M. Wierk; second vice president, Hermann Irion; third vice president, Charles M. Geiger; secretary, Joseph Husson; treasurer, Nat Mallouf; directors, W. P. Held, J. B. Dolan, E. P. McDowell and H. V. Middleworth.

TO SELL 40,000 WAR TRUCKS.

Indications at Washington are that between 30,000 and 40,000 trucks owned by the War Department will be dumped on the market this year. Leaders in the industry have already offered to assist in seeing that these trucks are distributed without injury to the trade and it is anticipated that government officials will see that this course is followed in the interests of justice.

NO NEWARK TRUCK SHOW.

Motor truck dealers of Newark, N. J., crowded out by the demand for space at the passenger car show, contemplated a show of their own for March, but have abandoned the project.



I. T. C. Self-Loading Industrial Truck, with Special View of Rear-End Mechanism.

STRONGEST SERVICE UNIT IS COURTESY

The small dealer can give service without investing a fortune in parts and mechanical equipment. He can offset his failings in this regard by the mightiest unit of service, which is COURTESY.

Courtesy includes prompt and earnest attention, time giving, willingness to be inconvenienced, personal interest and the kept promise. It means that the dealer goes as far as he can with the equipment which is his to command. This equipment may be little more than common sense and a real desire to do what is right by his client. Yet these are often enough to give satisfaction. The truck owner can usually be shown that the dealer is ready to do his best and few owners ask more.

If the dealer does not carry the needed part in stock it will pay him to wire or telephone to the nearest parts station. There is no reason why this service should not be charged for and few men who have a broken down truck will protest any charge that borders on the legitimate. Getting the truck back on the road a day sooner will pay for any little frills that may be thrown in to ensure speeding up the repair job.

A phone call to the owner when the part arrives brings him good news and shows that the dealer is interested in his particular job. Dealers usually have time to make this call themselves, proving that the head of the firm is himself seeing that Mr. Truck Owner is getting the best service the institution can provide. The dealer might also phone when the truck is ready to go out.

In addition to impressing the owner with the dealer's interest this latter plan usually brings up the question of payment and where all business is not done on a cash basis, usually elicits a statement from the customer as to when he will forward the check. This is important.

The big point is that the small dealer should consider himself the manager of the courtesy department. Every man likes to do business with the main stem of the establishment. The dealer can promise things and make good his promises. The employee often "guesses" or "thinks" certain things can be done.

Particularly does this formula apply with a dissatisfied customer. No underling should ever be allowed to receive a

complaint. This rule also puts the dealer at the head of his complaint department, which is where he belongs. Instead of ironing the ruffles out of a disgruntled man's temper the employee usually puts his own temper at work. A clash of wills in a case of this kind generally means one customer less. No small dealer can afford to lose a single customer.

It is the dealer's duty, therefore, to meet the man who has any steam to let off and see that it evaporates without doing damage. Instances where this cannot be done are almost unknown, if the right prescription is followed. The dealer must have judgment and initiative and the ability to study his man. These are attributes which the right kind of dealer is never out of. They should be always on file ready for use, not only in emergency, but in every operation that entails the interests of the concern.

As chief of the courtesy and complaint departments the small dealer can be the biggest asset in the establishment and the mightiest factor in the success of the business in which his capital, time and labor are invested.

The Garford "8 in 1" Convertible Farm Body

The Garford Motor Truck Co., Lima, O., announces a new "8 in 1" convertible farm body which should prove very popular.

This convertible body is the ideal equipment for the farm truck, as it is easily adjusted in one minute's time to properly take care of any kind of a load from loose grain to cattle. It is readily changed over without the use of tools into any one of eight various combinations.

The material and workmanship is of the highest quality, while the lumber used is straight-grained and free from knots. All metal parts are of pressed steel or drop forgings and it is a thoroughly reliable body with the additional advantage of its convertibility, while it weighs and costs no more than the ordinary body.

These bodies have been especially developed, after much experimenting by the manufacturer, for use on Garford trucks, but may be adapted to trucks of other makes by making slight changes.

The combinations that may be obtained with this body are as follows:

- Hog or poultry rack.
- Flat rack for crates, etc.
- Basket rack body.
- Flared rack body.
- Grain tight body.
- Flat rack—lowered scoop board.
- Flared body for coarse grain.
- Stock rack body.

These bodies are made in three sizes as follows:

Model A, No. 0, width 45 inches, length nine feet, shipping weight (crated) 690 pounds, capacity (small grain) 61 bushels.

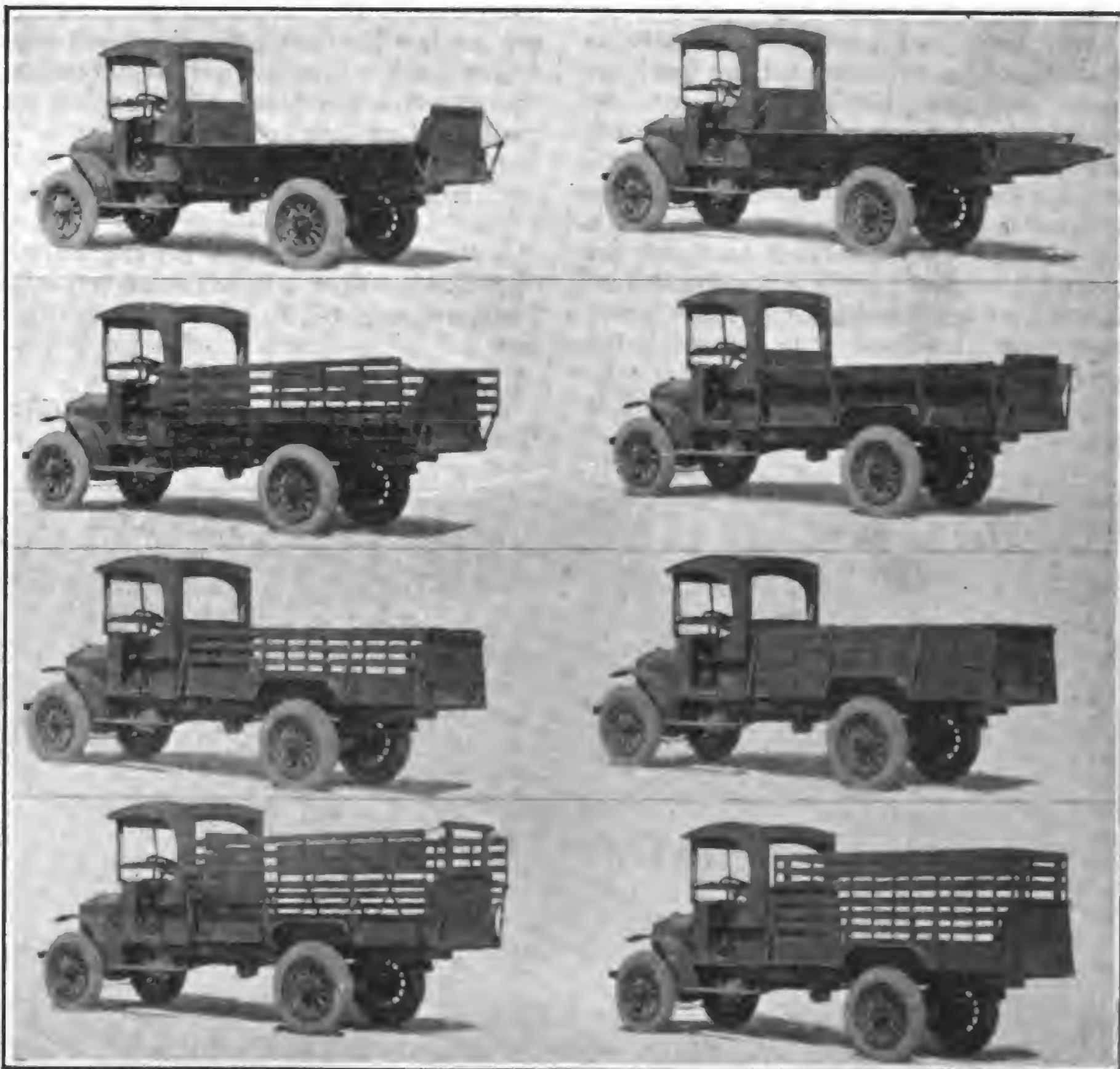
Model A No. 1, width 45 inches, length

10 feet, shipping weight (crated) 760 pounds, capacity (small grain) 68 bushels.

Model B, No. 11, width 50 inches, length 12 feet, shipping weight (crated),

904 pounds, capacity (small grain), 92 bushels.

Model A, No. 0, and Model A, No. 1, are for 1½-ton chassis. Model A, No. 1, and Model B, No. 11, two-ton chassis.



Cut Shows Eight Types to Which Garford Farm Body May Be Readily Converted.

HIGHWAY USAGE INCREASED 500 PER CENT

"The actual vehicle mile use of our roads, it is estimated, has increased more than 500 per cent. in strictly agricultural communities and more than 1000 per cent. near the larger centers of population. These figures indicate the extent to which community and short haul transportation will be served by better highways."

This is the statement made by Secretary of Agriculture Meredith in his annual report, and continues: "In 1906 only 48,000 motor vehicles were registered in the United States. In 1914 the number had risen to 1,700,000, while registrations now total nearly 8,000,000, exclusive of motorcycles."

Immediate consideration should be given by Congress to plans for extending the federal aid road building programme, the period for which by the original act, as amended, terminates with the close of the present fiscal year, he says. In order that there may be no halting in the work it is hoped at its next session, he adds, that Congress will provide additional funds to be expended under the terms of existing legislation with certain modifications, at the rate of \$100,000,000 a year for a period of five years, beginning with July 1, 1921.

Future legislation, the secretary said, should not disturb the principles embodied in the act of 1916, which have been tried out and found to be so satisfactory, and only those changes should be made which experience has clearly shown to be desirable.

Both the federal and state highway departments should know, as promptly as possible, the programme for the next five years, in order that the work may be adequately planned and the engineering and administrative details carefully executed. Forty of the state legislatures will be in session this winter, when it will be necessary for them to make the requisite provision for meeting future federal apportionments. From every standpoint, therefore, it is essential that legislation for the continuance of the programme now under way be promptly enacted.

"Provision should be made also for the continued building, on an adequate scale, of roads within or adjacent to the national forests."

In view of the abnormal conditions which have prevailed since 1916, the report stated the progress that has been made in placing a large highway improvement programme under way is surprisingly good. In the three years, 1917, 1918 and 1919, there were approved 677 projects, calling for the construction of 5790 miles of road and involving a total cost of \$56,418,673, of which the federal share was \$23,931,618. During the fiscal year 1920, 1670 projects submitted by the states, involving the improvement of 16,670 miles and a total allotment of \$109,830,366 of federal funds, were approved. At the end of the year 14,940 miles of federal aid roads, on which \$103,925,094 of federal funds had been allotted, were under consideration and in various stages of completion, while 1677 miles had been entirely completed. Preliminary engineering investigations have been made on 4003 miles of forest roads and construction has been completed, or is in progress, on 1300 miles.

"It required a great national catastrophe to awaken the American public to the inadequacy of our transportation facilities and to the fact that we must depend largely upon our highways, in conjunction with motor vehicles, when a sudden expansion in transportation is essential," said the secretary. "Our experiences during the last three years have clearly demonstrated that the failure earlier to inaugurate a sound road improvement programme has retarded the effective development of one of our most vital national requirements."

HIGHWAY OVER HUDSON.

A plan is under way to convert part of the bridge over the Hudson river at Poughkeepsie, N. Y., into a motor highway.

The Ford Motor Co., manufactured 130,745 trucks in 1920.

HIGHWAY LIGHTHOUSES.

The entire state highway system of Wyoming is soon to be equipped with a series of lighthouses which will plainly mark out the way for the motor truck operator. Dangerous curves will be designated by yellow lights and railroad crossings by red lights. The lighthouses will "wink" 45 times a minute, throwing a nine-inch ray, which can be seen more than three miles away.

These lighthouses will also serve the purpose of giving the road mariners their bearings, as special flashes of light will be thrown out to indicate just where the lighthouse is located. It will prove a great aid to the motor truck driver who is doubtful of his exact whereabouts.

With the roads carefully charted by lighthouses it will be possible to operate trucks both day and night, and so obtain double service from them, making 24-hour service a reality instead of a possibility.

GOOD ROADS SHOW.

The American Road Builders' association will hold its 18th annual convention, 11th American Good Roads Congress and 12th National Good Roads Show at the Coliseum, Chicago, Feb. 9-12. More than 40,000 square feet of floor space will be devoted to the exhibits, which will outnumber those displayed at any previous show. Many new types of road building machinery and highway transportation equipment will be shown. There will be demonstrations in the use of road building and street paving materials under improved methods and conditions. Exhibits will be confined to the materials, machinery and equipment used in the construction and maintenance of roads and pavements.

NEVER MISSES A TRIP.

A vehicle in hard service which has never missed a single trip is the five-ton GMC lorry shown in the accompanying illustration. This job is owned and operated by Southard & Day of the Quanault Shingle Co., Aberdene, Wash. It has been engaged in the lumber business ever since its purchase, hauling huge loads day in and day out. There are 93,000 shingles in the load shown. Two of these loads are valued at \$900.

TO DIRECT HIGHWAY STUDY.

C. T. Tilden, professor of engineering mechanics at Yale university, has been named to direct the work of the Highway and Highway Transport Education committee, with headquarters at Washington, D. C. Yale would not let him go permanently, but has granted him a year's leave of absence to take up this important work. He is one of the best known engineering educators in the country.



Five-Ton GMC Lorry Which Hauls 93,000 Shingles on a Load with Ease.

Mr. Middleman Gets K. O. Blow From Bay State Farmers

By CLEVELAND GRAY

MR. MIDDLEMAN, who has been living on milk and honey for many a day, would have to confine himself to honey hereafter if the farmers of the country would follow the example set by the Producers' Dairy Co., 725 Belmont street, Brockton, Mass., an organization of 89 farmers of that territory, which markets the product of the dairy farm direct to the consumer.

These farmers get at least two cents a quart more for their milk than do those who ship to Boston and the consumer gets a finger in the pie by being enabled to purchase his milk a penny cheaper than the Boston price.

Moreover, the producer has no surplus milk left to eat up whatever profit he may have earned. The Producers Dairy Co. takes his entire supply, turning the surplus into cream and skimmed milk for which a ready market is found. Starting with the next heated season the company will also manufacture ice cream.

W. N. Giles, head of the New York state grange, declared during the recent national convention of grangers at Boston that many farmers get not over four and 4½ cents net for the milk that is sold in the city for around 20 cents. For an apple which brings 15 cents at the fruit stand the farmer often gets 1/15th of a cent.

Any organization which takes a slam at the fellow in between who squeezes out the difference between these prices, and comes mighty near being the prince of profiteers, is worthy of commendation and emulation. The man who waters stock and picks up suckers, or the dispenser of oil stock, is a pillar of society and a paragon of virtue beside the person who soaks the producer and the consumer of farm products. In the profiteering class the latter is away out at the head of the profession.

Cooperative institutions founded on principles akin to the Producers' Dairy Co. furnish the remedy to wipe out these modern brigands. The American people have stood for this species of highway robbery long enough. It is up to every farming community to launch a movement of this kind. The wideawake citizen who knows on which side his bread is buttered must get behind any plan of this kind with both shoulders.

The producer and consumer, long the victims of these blood-sucking gentry, could eradicate the breed in the twinkling of an eye if they would present a united front and not waste any ammunition, giving Mr. Middleman the full benefit of every load.

On a Business Basis.

The Producers Dairy Co. has gone at the business in business style. The ven-

ture is a recognized success. The company is capitalized at \$150,000, owns valuable property, has a strong executive and administrative organization, safely guarantees its members a profit, in addition to a high price for their product, and relieves the member of all worry as to the distribution of every gill of milk he can turn out.

Naturally a progressive, efficient industry of this nature cannot be carried on without modern methods of transportation. Motor trucks collect all milk that comes to the company's headquarters and distributes it to the wholesale trade, which is the particular element among its patrons. Horses are used to deliver milk to the retail trade.

The wholesale trade includes hotels, restaurants, grocery stores and meat markets. All of the shoe shops have restaurants of their own and most of these are served by the company. None of the factories or stores open before 7 o'clock, but when they do open they want their milk at once. As a result all the milk to the wholesale trade must be and is distributed between 7 and 8:30 a. m.

Owens Four Trucks; Hires Three.

The company has four trucks of its own and hires three regularly. The hired trucks do all the collecting. Formerly the concern gathered its own milk, but encountered such trouble in getting dependable drivers that an opportunity to get the milk picked up by farmer members, using their own trucks, was grasped when the price was deemed right.

The company trucks are a 1½-ton White, two ¾-ton Whites and a ¾-ton G. M. C. The two smaller Whites are now held as reserve equipment. The larger White and the G. M. C. make the

wholesale deliveries. The surplus of haulage power is due to the new policy of hiring trucks for collection work. Nevertheless the company does not intend to sell its spare haulers, holding them for special work and for an emergency.

In this connection Manager M. J. McNamara points out that a truck load of milk is worth something like \$200 and that milk is a perishable product. A blowout or broken down truck would mean a loss of the full amount if the delay were long enough to spoil the fluid. A saving of \$200 in just one instance would pay the interest on the money invested in the two extra trucks.

The 1½-ton White, which, by the way, is in its 10th year of service, usually hauls 1600 quarts of milk a day into Brockton. During the severe storms of last winter this was said to be the only truck entering the city. During this period the truck usually carried a load of 2000 quarts. The G. M. C. bears an average load of 1100 quarts, the daily wholesale deliveries averaging about 2700 quarts.

Delivers 2700 Quarts in 90 Minutes.

Delivering 2700 quarts of milk in an hour and a half is a feat beyond the number of horses any organization could economically employ. At the same time the running around the country, mile after mile, in collecting the supply is also a stunt which puts the horse in the discard. Not only would the mileage be beyond equine equipment, but the time in which this work must be done to ensure good service bars the horse from considerations.

The company pays its members 10 cents a quart for milk delivered at the platform of its pasteurizing plant. This



White Truck Which Plays Big Part in Enabling Farmers to Sell Milk Direct to the Consumer.

SERVICE "RED PYRAMID SPEED TRUCK"



Service Speed Truck, with Wheels Distorted, Exemplifying Scientific Cushioning.

The Service Motor Truck Co., Wabash, Ind., announces the successful termination of a 1200-mile test run of its new "Red Pyramid Speed Truck" through the states of Indiana, Ohio, Pennsylvania and West Virginia.

The test run was in charge of Charles Guernsey, chief engineer, and Malcolm Randall, experimental engineer of the Service Motor Truck Co.

For three days the driving was through snow from eight to 12 inches deep and 400 miles of the run was in the Allegheny mountains and foothills, part of the traveling being over very bad mud roads. It is stated that the truck was subjected to an amount of abuse equal to that of the average motor vehicle in two years of ordinary service, that the truck showed remarkable performance and endurance qualities, and that it will go anywhere on low gear where traction can be obtained.

On the other hand, the truck on the best of roads is capable of travelling at the rate of 45 miles an hour without harm to the engine or truck.

The truck for this occasion was loaded with a 100 per cent. overload, and it was found that it would successfully climb a five per cent. grade on high gear at high speed. The load carried, exclusive of driver, was 3200 pounds, and in addition this experimental truck was between 300 and 400 pounds heavier than the production models, due to the use of hand forgings instead of drop forgings, manganese bronze castings instead of malleable castings, etc.

The truck was driven in stretches up to 35 miles at a speed of more than 40 miles an hour. Time after time the good acceleration and riding qualities of the truck enabled the testers to pass touring cars, particularly in rough going.

As part of the test several runs were made up and down Summit mountain, near Uniontown. This hill is three miles long and has a grade in it from eight to nine per cent. throughout its entire length. The total rise in three miles is about 1600 feet, many prominent passenger car manufacturers using this hill to test the climbing ability of their cars.

Model 15 went over the top in second

gear at a speed of 15 miles per hour, with a load of $1\frac{1}{2}$ tons. No difficulties of any kind were experienced, either with the cooling system or any of the driving parts.

Four Years of Experimentation.

This truck, Service Model 15, is the result of over four years of experimentation, and the principle of scientific cushioning, embodied in other service trucks is also developed to a very high degree in this "Red Pyramid Speed Truck" of Service make. It is equipped with a Mid-west model 408, $3\frac{1}{2} \times 5$ engine.

A unique front spring suspension is probably the most unusual feature of this job. At the front end of the truck a semi-elliptic spring is mounted crosswise, the end being carried on the axle and the center supporting the frame. This spring is pivoted on its central point, so that the front axle is perfectly free to move about this pivot.

The entire truck, with this suspension, is carried on a three-point support, which, in fact, cushions body, hood, radiator, seat and steering mechanism against strains and twisting. At the same time a great deal of the twisting and racking strains are removed from the frame.

A further quite remarkable improvement is made in the riding qualities. With this front spring arrangement, the lift on one end of the truck, when the front wheel strikes an obstruction, is only one-half of that of the conventional construction, and the result is that there is only one-fourth of the racking strain. As a result the truck moves over a rough pavement or a cobblestone street with remarkable ease.

A Unique Feature.

A rather unique feature of construction is in the spring shackle bolts and their method of lubrication. The shackle bolt is drawn from a single sheet and after being carbonized is finished in the usual manner. These bolts are $1\frac{1}{4}$

inches in outside diameter, containing on the inside of the bolt a reservoir $\frac{3}{4}$ inches in diameter. This reservoir is used to carry an oil supply, which feeds by splash through felt pads from the reservoir to the working surfaces outside.

The oil supply can easily be replenished by lifting up the spring cap on a specially designed carrier and filling with an ordinary measure.

The accompanying illustration showing the front wheels greatly distorted, exemplifies the scientific cushioning principles as applied to the front spring suspension. It will be noted that, although the wheels are badly out of line, this twisting, or strain, is taken up by the front springs and is not in any way transmitted to the side members of the chassis or the body. This is particularly important when fine panel bodies, such as are frequently used on delivery jobs, are mounted on the truck.

EXTENDS TRADE ZONE.

George R. Eldridge, the largest butter and egg distributor in Detroit, Mich., recently extended the zone of his operations to Port Huron, the round trip, including detours, covering 160 miles. The motor truck did it. Mr. Eldridge did not believe it possible and was only satisfied after a Duplex Limited had demonstrated its ability to handily negotiate the route. Every other day the trip is made. The truck leaves at 6 a. m. with two tons of butter and eggs, delivers to 38 customers and is back in Detroit by 7 p. m. Incidentally the roads for this haul are very bad.

HIGHWAY BODY TO MEET.

The next meeting of the Highway and Highway Transport Education committee will be held at Michigan University, Ann Arbor, Mich., Feb. 23.



Service "Red Pyramid Speed Truck" Which Has Made Highly Successful Test Run.

IMPROVED INTERNATIONAL MOTOR CO. BUS

The International Motor Co., New York city, maker of Mack trucks, in recognition of the fact that future of the motor bus depends on the development of the vehicle more than any other factor, has designed a new type of bus which eliminates the undesirable features of many of those now in use.

The body is constructed of steel, including underframe, upright side panels and roof. Seats, either of cane or leatherette, are placed crosswise; interior upholstery and interior lighting have been greatly improved; ventilators are installed; curtains for the windows are furnished; illuminated revolving signs indicating destination, non-rattling windows and exhaust heating for cold weather have been provided, and the body has been placed on a chassis of such power and dependability as to insure regular operation under the most severe conditions.

Although smaller and lighter than the usual trolley car this bus with its large, pneumatic tires, gives greater comfort and ease of riding than is obtainable in the trolley. In addition it has the speed and flexibility of operation which has been responsible for the ever growing popularity of motor bus transportation.

Passenger transportation by motor bus is rapidly leaving the realm of the experimental and entering into a period of sound development in its legitimate sphere. This development has been of two kinds; first, better management of bus lines; second, improvement in the vehicle itself. The new Mack bus is a definite step in the latter direction.

Motor bus service properly organized and operated so as to supplement existing transportation systems affords the only practicable means of handling increased traffic in cities of moderate size and of satisfying the demands of the public for better service without extensive and prohibitive outlay for new plant, trackage and equipment. As feeders for existing transit systems, as rush hour carriers and as successors of unprofit-

able branch lines of the present trolley systems they have a field of usefulness which all transportation experts recognize.

DUPONT HEADS GMC BOARD; OTHER EXECUTIVE CHANGES.

Changes in the governing personnel of the General Motors Co. took place at a meeting of the directors Jan. 13 as a result of the recent acquisition of large holdings in the corporation by the Du Pont interests.

The resignation of W. C. Durant as a chairman of the executive committee and member of the finance committee was accepted, as was that of F. W. Hohensee as a director, vice president and executive committeeman.

P. S. Du Pont was then elected chairman of the executive committee. Three other members named were J. J. Raskob, J. A. Haskell and A. P. Sloan, Jr.

F. D. Brown was elected a member of the finance committee, and C. F. Katterling and A. H. Swayne were made vice presidents. Mr. Swayne also was placed on the board of directors.

HAMILTON MOTORS CHANGES.

Hamilton Motors Co., Grand Haven, Mich., maker of the Apex truck, has appointed H. A. Oswald secretary-treasurer and general manager. F. A. Inman has been named assistant to manager and office manager. E. A. Graham, representing the interests of President Adolph Pricken, has been appointed factory manager and fiscal agent. Warner Hansen takes the post of factory superintendent.

BIG SEWELL CUSHION SALES.

For fiscal year ending Dec. 31, 1920, sales of Sewell Cushion Wheel Co., Detroit, Mich., manufacturers of resilient motor truck wheels, showed an increase of 61 per cent. over sales of 1919.



All-Steel Cab Produced by the Sheet Steel Products Co., Michigan City, Ind.

ALL STEEL PRODUCTS CO. PRODUCES CAB THAT WINS BIG FAVOR

The Sheet Steel Products Co., Michigan City, Ind., has put on the market an all-steel cab, which is winning big favor. The only wood on this unit is the roof itself, which is of oak, and is bound with steel and covered with a good grade of oil duck.

The cab is equipped with five large windows of double strength glass. The window frames are specially made of formed steel and are so arranged that should any accident occur it is only necessary to use two screw drivers to change the glass, which is standard size, 16x16. Windows in the sides and doors disappear into the casings and the rear window slides sideways to give convenience in operating hoist lever.

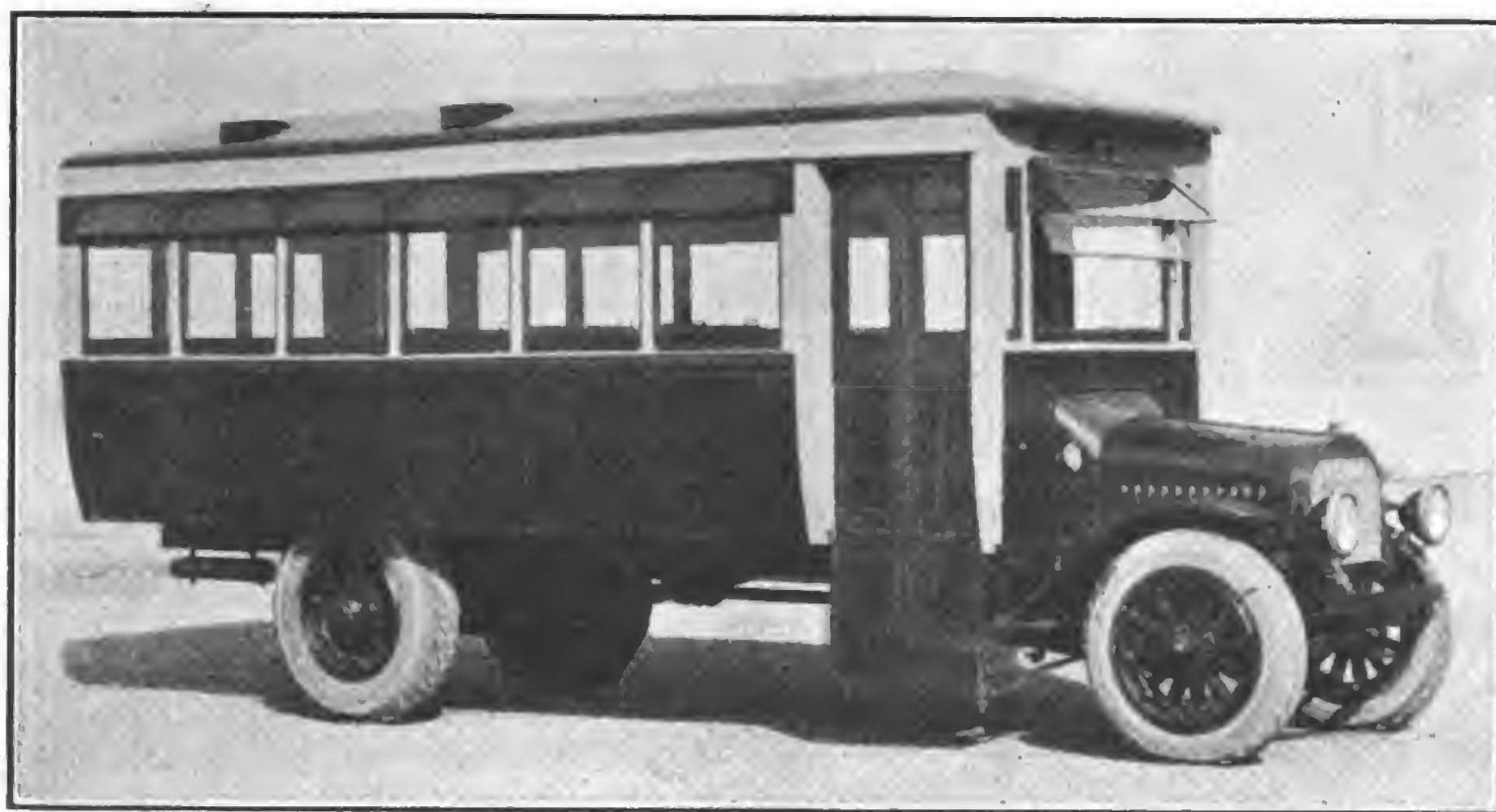
Rattle is reduced to a minimum, first by the use of steel welded and riveted construction where there are no wood screws to come out and joints to loosen up, and second because proper care has been taken to eliminate rattle in all moving parts. Windows for instance are held in place by springs.

The doors are equipped with a special lock of the company's own device, which allows ample play for weave and still is self-adjusting. Drumming is eliminated by the proper forming of the metal, so that there are no large areas of unsupported single sheet construction.

The windshield is of the two-piece rain vision ventilating type, steel molding construction.

The cushion is constructed of a good spring, curled hair padding and a good grade of imitation leather covering, with a comfortable curled hair padded back.

The Denby Motor Truck Co., Detroit, Mich., received cheering news recently through the visits of two foreign distributors, A. W. Campbell, Tampico, Mex., and A. Grieve, Lima, Peru. Both brought the glad tidings that there was strong demand for Denby trucks in their territories.



The Newest Mack Omnibus, Produced by International Motor Co., Which Eliminates Objectionable Features and Adds Desirable Ones—Provides Comfort and Ease of Riding.

NO OVER-PRODUCTION IN 1920 OUTPUT OF 335,000 TRUCKS

In the year 1920 the production of trucks was 335,000, the 1919 output being exceeded by 30,000. The increase was mainly in speed trucks of three-quarters to one ton capacity. Almost 75 per cent. of the trucks turned out were of one ton or less capacity against a 60 per cent. ratio of 1919.

The slight increase in price during the year has also been largely confined to this class of vehicle. Yet figures show that the most popular model is the 1½ tonner, nearly one-fifth of the models manufactured being of this capacity.

Motor trucks registered in the United States now total 900,000.

The wholesale value of motor trucks produced was \$432,746,463.

The average wholesale price of each truck is \$1273.

There are 170 truck manufacturers in production.

There are 300,000 people engaged in truck and car manufacture.

The number of trucks exported was 27,000.

The increase in exports over 1919 was 60 per cent.

The value of the trucks exported was \$45,000,000.

Trucks owned by farmers total 80,000.

The value of labor saved to farmers annually through each truck is \$150.

The saving in transport charges to each farmer

through use of truck rather than other form of transportation is \$240.

The number of countries to which trucks and cars were exported was 114.

➤ About 60 per cent of trucks are equipped with the worm final drive. Pneumatic tires are now standard on practically all trucks of one ton capacity and are either all around or in front on most of many of the 1½ tonners.

Metal wheels have replaced those of wood on most of the heavy models. The dry disc clutch has become the most popular, as have cast case radiators, tubular cores and vacuum fuel feed systems. The four-speed gear boxes are standard equipment on trucks of two ton capacity and over.

There are 20,596 truck dealers, 38,538 garages and 47,556 repair shops in the United States.

The automotive industry pays \$257,000,000 in special taxes annually and \$81,000,000 in registration fees. Its shipping bill to the railroads annually is \$100,000,000.

The wholesale value of cars and trucks produced is \$2,136,183,676.

The car production for the year was 1,906,000 and the cars registered number 7,600,000. There were 32,400,000 tires produced.

YALE 1½-TON TRUCK IN PRODUCTION

The Yale 1½-ton truck has been designed for a trade which desires a truck larger than the average ¾-ton capacity truck, and yet with its ability to attain speed on the road, cutting down delivery time, and performing the work at a minimum of expense.

The Yale Motor Truck Co., 10-12 Bassett street, New Haven, Conn., announces that it is in production on a truck which answers this purpose. The truck is of ample size to carry loads of this capacity, is powered with an engine of sufficient power for all needs, and is equipped with all the necessary accessories, including top and windshield, self-starter, generator and electric lights, for this type of work.

The engine is of the removable head type, which gives access to the top of cylinders for cleaning carbon, grinding valves, etc., 3½-inch bore and five-inch stroke developing 35 horsepower, and of unit construction.

The lubrication is supplied from a sump or reservoir in the base and is forced to the bearings by a power-operated oil pump, while advantage is also taken of the splash of the connecting rods dipping into the oil, held in troughs under the rods to splash the oil to all internal parts of the engine.

Cooling of the engine is accomplished by means of a positive driven water

pump and four-blade fan, working in connection with the radiator which is of ample size.

Carburetion is by a Stromberg, type M carburetor, fitted with 1¼-inch outlet. The starting and lighting outfit includes a Westinghouse generator and starting motor and battery, supplying electricity for starting, lighting and ignition.

The clutch is of the Borg & Beck type, single plate, positive acting and smooth in action, while the transmission is a Cotta with gears always in mesh. Both brakes are internal on the drums of the

rear wheels, and the rear axles are of nickel steel working from a worm drive through Hotchkiss drive.

The manufacturer states that the Yale 1½-ton truck is guaranteed to meet every requirement in its field and will give maximum service under conditions which demand a truck of this capacity.

The wheelbase is 132 inches and the truck is fully equipped with the necessary accessories, including Yale non-skid 35x5 inch tires, and all necessary tools for its successful operation. Tests show its utility from every standpoint.



Yale 1½-Ton Truck, Which Develops 35 H. P. Speeding Up Deliveries.

TRUCK A REGULAR WATER DOG

How would you owners who live near the water like to own a swimming truck?

It sounds like "going bicycle walking in a boat," but the George E. Keith Co., manufacturers of Walk-Over shoes, Brockton, Mass., has a three-ton, four-wheel drive Duplex that is as much at home in the water as it is on land and, according to Traffic Manager Carlton R. Blades, there isn't any place where the machine can't go. He is authority for the statement that has to do with the water dog performance of the vehicle, and his veracity is unquestioned.

It seems that in the latter part of 1917, some time along about 8 o'clock on one of those shivery mornings that make a fur coat feel like a cambric "nightie," the truck started over the frozen road for one of the box factories owned by the company.

The going was slippery and the driver had some difficulty in keeping the machine from skidding. Just as he was about to cross a bridge that spans a small river the hind wheels hit a patch of smooth ice and with a gentle side slip the whole works did an Annette Kellerman into the river, crashing through the thin ice and scattering it in all directions.

The driver of the truck never turned a hair, according to witnesses, and proffered assistance was refused.

"This buggy don't need any wrecking crew a-tall," he said nonchalantly lighting a cigarette with half frozen fingers. And after a few experimental puffs he proceeded to prove the truth of his assertion.

Throwing his gears into reverse, he carefully backed around, and then, going into low, with a generous pressure on the throttle, gently coaxed the big machine out of its wet parking place, up the bank and onto the dry land.

Without seeming to presume on the reader's credulity, subsequent investigation proved that the truck was frequently used as a tractor at the wood lot

where the box factory is situated, and the driver thought nothing of going into the stumped off area and towing out tree trunks that had lodged while falling. It always worked with a trailer when on the roads, many of which in the lumbering region were anything but good, and towed five tons of boxboards, being loaded with a similar amount.

Pretty good for a three-ton truck. Though three years have passed since the incident happened, the Duplex is still as full of pep as ever, and on the occasion of the writer's visit to the factory was still ploughing along as though she had just come from the repair shop—though as a matter of fact, repair shops and overhauling are an unknown quantity in this truck's existence.

HEATED TRUCK CABS ATTRACT AND HOLD GOOD DRIVERS

It is rapidly being recognized in the industry that the heated truck cab solves the problem of attracting and retaining the better class of drivers. There is no valid reason why a motor truck should not be warm and comfortable, quite as much as a steam or street car or other commercial vehicle. As the slogan of the largest manufacturers of these devices has put it, "the heat is there—why not use it?"

During the war a certain motor car manufacturer determined to experiment with motor truck construction at least for a while. The time was winter. A number of trial trucks were turned out. Several of these had heated cabs. Before long the drivers insisted upon operating only heater equipped trucks. This, of course, was mere personal preference.

The mileage records revealed the fact, however, that the heated trucks were traveling twice as far as the non-heated vehicles. The drivers did not return

with poor showings and the ancient explanation that "they had to stop off every now and then to get warm."

The machines were moving all the time. Moreover, motors were not spinning up gasoline bills while drivers, cold or presumably cold, were toasting their shins in conveniently located pool rooms. Many dollars were saved in this way.

In short, the passenger car company—one of the largest and most prominent in the United States—found the installation of heaters in their trucks so good an investment that as soon as the temporary conditions disappeared and they went back to passenger car manufacture, they became the largest single users of heating equipment in their field. The heater adopted happened to be the "Perfection," made by the city of Cleveland.

Initial Cost is All.

The common principle of the various heaters is the utilization of exhaust gas that would otherwise be lost. In the "Perfection" models—there are exactly a dozen of them—a valve is attached to the exhaust pipe just forward of the muffler, and is operated by a conveniently placed lever. Opening the valve causes a portion of the hot exhaust gas to be deflected through flexible steel tubing to the heater radiator. In the radiator the heat is passed through horizontal gas-tight tubes, which prevent fumes, and thence escapes into the air underneath the car.

The system, manufacturers say, is correct, as well as economical. The heat is introduced into the machine by direct radiation, precisely as buildings are heated by steam, and is entirely odorless. There is no expense beyond the initial cost of installation, inasmuch as waste products are utilized.

The "Perfection" line includes two heaters for motor trucks, known as the "DW" and "DWS" types. These are designed to fit in the angle between the heel board and the floor of the cab.

LEADERS CONFIDENT.

Recently published statements as to the future of the automotive industry include the following:

H. H. Rice, Vice President General Motors Corporation—"With the opening of spring we are going to see quite a revival of business. We are confident of the revival so far as our own business is concerned, and we think other lines of business are going to keep pace with it. Business is going to pick up, surely and steadily."

Alvan Macauley, President Packard Motor Car Co.—"There are very good and substantial reasons for optimism. Business conditions in general are bound to improve—and improve rapidly."

A. T. Waterfall, Assistant General Manager Dodge Bros. Co.—"The turn in the tide has already set in. It has been inevitable as an early development. The automobile factories already are beginning to resume production."



Duplex Four-Wheel Drive Three-Ton Truck, Owned in Brockton, Mass., Which Is at Home on Land or Sea.

THE FEDERAL ELEVATING DUMP BODY



Federal Dump Body View Shows Strong and Simple Lifting Frame.

The Federal Motor Truck Co., Detroit, Mich., has found in the trade an insistent demand for a practical elevating dump body which would be simple in operation and practical in actual service. The company has responded to this demand with a product of its own which appears to meet every requirement. This body, which is now in production, was designed primarily to be used for dumping a load from an elevated position, but it may also be used as an ordinary dump body. This type of body is extensively used in various branches of the coal business, road building (dumping into concrete mixtures), garbage collection (dumping into a large body), etc.

It is composed of three principle units. A dump body, very much like an ordinary body, a hydraulic hoist and an elevating mechanism under the body. This body has two dumping positions. The elevated position, which raises the lower end of the body six feet above the ground, and the ordinary dumping position.

The dump body is the ordinary type of body with a flat sliding bagging chute door in the tail gate and carrying an 18 foot telescoping chute in a cradle under the body. The hoist is the Federal standard heavy duty hoist excepting the cross arm at the top, which is attached to a solid instead of a pivoting bracket.

The elevating mechanism is composed of the following parts:

1. Frame Extension—Extends above chassis frame—strengthens frame and carries shafts, brackets, etc.

2. Elevating Frame—Pivoted at rear and carries lifting arm at front and main elevating lever at center. Is elevated just as ordinary dump body.

3. Main Elevating Lever—Pivoted at center of elevating frame; lower end anchored to frame by pull rods—upper end elevates body.

4. Pull Rods—Pivoted at lower end of main elevating lever. Lower ends have a cross shaft, which is engaged or disengaged by release hooks.

5. Release Hooks, Shaft and Hand Lever—A shaft holding two large cast steel hooks is connected by brackets to the frame extension just above the rear axle. On the right end of this shaft, and outside of the frame is a hand lever, which throws the hooks forward to en-

gage the pull rod shaft for the elevating position, or backward to release the pull rods for ordinary dumping position.

6. Front Elevating Member—This member being joined to the body and the main elevating frame, lies almost flat when the body is down, and advances towards an upright position to give sufficient angle for dumping, when the body is elevated.

The Operation.

Elevating Dumping Position—The body is elevated into dumping position by the hydraulic hoist, which is controlled from the driver's seat in the usual way. The release hooks are engaged, as indicated by the hand lever resting in the forward position. To illustrate the method of operation, grasp a lead pencil between the thumb and forefinger of the left hand, at a distance of about one-third from one end and hold in a horizontal position. With the other hand press down on the short end. If an object representing the dump body were on the long end of the pencil, it would, of course, be elevated. The thumb and forefinger of the left hand represents the pivot shaft of the main elevating lever, which is supported by the elevating frame. The forefinger of the right hand pressing down on the short end of the pencil represents the pull rods pulling down on the lower end of the main elevating lever.

Ordinary Dumping Position—If it is desired to dump without elevating—that is in the ordinary position—throw the release hook lever toward the rear, thereby releasing the pull rods. Operate hoist in the usual manner. The body, resting on the elevating frame, is raised at the front end only.

The Specifications.

Body—Eighty cubic feet for soft coal, smaller bodies for other materials.

Height—Of lower end of body, above ground, when loaded, six feet.

Hoist—Heavy duty; diameter of cylinders, six inches.

Elevating Frame—Rolled steel channel, six inches deep; weight, $10\frac{1}{2}$ pounds per foot. Well braced by $\frac{1}{4}$ inch thick cross members.

Elevating Lever—Center and lower end made of single steel casting—long, or upper, end tapered pressed channels securely riveted to lower end, and with steel casting for body shaft at upper end; well braced by $\frac{1}{4}$ inch thick cross members and gusset plates and supporting three cross shafts.

Pull Rods—Connecting lower end of elevating lever to frame, $\frac{3}{4}$ inches thick by four inches wide—steel.

Front Elevating Member—(Between body and elevating frame) two side angle irons $2\frac{1}{2} \times 3 \times \frac{3}{8}$, and two cross angle irons $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$.

Four cast steel shaft brackets at corners.

Shafts—Two shafts under body, steel, $1\frac{1}{4}$ inch diameter. At center of elevating frame and lever, steel, $1\frac{3}{4}$ inch diameter. At lower end of elevating lever, steel, $1\frac{3}{8}$ inch diameter. At lower end of pull rod, nickel steel, 2 inches diameter. Hook supporting shaft, in frame extension, steel, $1\frac{1}{4}$ inch diameter.

Frame extension and reinforcement for chassis frame, 3 inches high above frame, $2\frac{1}{2}$ inches flange and $\frac{1}{4}$ inch thick.

Springs—Special heavy rear springs provided on standard UE-12-110 chassis.

Weight—No. 780 Dump body (standard), 1200 pounds. Heavy duty hoist, 550 pounds. Elevating mechanism—telescoping chutes, bagging chute in tail gate, etc., 1200 pounds. Total, 2950 pounds.

DURANT FORMS COMPANY OF HIS OWN TO MAKE CARS.

The Durant Motors Corporation has been organized by W. C. Durant, former president of General Motors Corporation. The new corporation will commence the active manufacture of cars about Aug. 1.



The Federal Elevating Dump Body Shown in Elevated Position—Note the Height.

NEW DEPARTURES AND DEVELOPMENTS

SIX-TON HOUSE MOVED IN QUICK TIME BY A 2½-TON TRUCK

"Buildings Moved While You Wait."

That's the kind of a sign Lahn T. Bia-luk, a general trucker at Bridgeport, Conn., is thinking of hanging out following his success in recently bringing a six-ton frame structure from one end of that city to another by motor truck in a comparatively brief time.

Despite the heavy load the truck used was but a 2½-tonner, the product of the Bridgeport Motor Truck Co. The large body and cab usually found on this truck was taken off to do this job.

This truck, by the way, was one of the first turned out by the Bridgeport Motor Truck Co., which concern is now in practically full production. This truck has been in constant operation since early in February of this year and the total sum expended for parts during that period amounted to \$2.52.

\$100,000,000 FOR ROADS.

Republican leaders of the House have agreed upon an appropriation of \$100,000,000 for state road aid. It has not been decided, however, whether to make this amount available for work during the coming fiscal year or for that year and the year following. Members of the roads committee expect action on the roads programme at this session of Congress.

A 3½-TON TRUCK FOR \$1200?

The rumor keeps cropping up that Henry Ford is experimenting on a 3½-ton truck which he plans to put in production about the middle of the year and market for something like \$1200. Mebbe so!

HEADING OFF THE PEST.

A certain leading truck distributor in a big eastern city has solved the problem of how to get rid of the pest, or the man he is too busy to see.

This dealer has a private office. An office boy takes the name of every caller. If the visitor is worth while he is ushered right in. No matter who is with the distributor the boy has instructions to announce each caller in turn. If he would like to see the man at his leisure he makes, through the boy, a later engagement. If he wants to get rid of the man for all time he bustles out and informs the caller of the pressing nature of the conference in which he is participating. The visitor takes the hint and gets whatever business he has to transact over with in a matter of seconds. When conditions warrant the caller is turned over to a subordinate.

In this way only those who have weighty business ever get inside the office of the boss. The latter realizes that, once comfortably seated, there are many persons who do not know when it is time to go. This little bit of efficiency saves many valuable minutes a day for a busy executive, with whom minutes count.

METRIC SYSTEM AGAIN.

A bill presented in Congress calling for the use of the metric system in the United States allows manufacturers to use any weight or measure in production, but provides for the use of the metric system in commercial transactions.

TRUCK MANUFACTURER SEEKS IDEAS OF MEN ON SELLING LINE

President G. C. Gordon of the Selden Truck Corporation, Rochester, N. Y., is "sold" on the merits of the Selden Advisory Council, a body composed of 11 dealers and salesmen from as many districts, who won their places through results scored on the selling line, and who recently visited Rochester at the expense of the corporation and gave their ideas and opinions as to various phases of the production of the Selden truck.

At the same time a Senate, composed of a number of the biggest dealers, was called to confer with the officials and division sales managers. Banquets and theater parties served to relieve the business demands on the gathering. The advisory council will be a permanent organization with elections once a year.

The first council was composed of the following men: J. L. Costella, sales manager H. H. May Co., Pittsburgh, who was elected president; J. C. Conley, sales manager of Baker Motor Sales Co., Boston, who was elected secretary; Geo. E. Stewart, manager Staten Island Sales Co., Staten Island, N. Y.; F. H. Tuxill, dealer at Syracuse, N. Y.; R. D. Godwin, dealer at Norfolk, Va.; William H. Gregory of Gregory & Son, Los Angeles, Cal.; C. B. Reser, sales manager Purdy Motor Corporation, Tulsa, Okla.; J. R. Carnahan, sales manager Mitchell-Selden Sales Co., Chicago; J. G. Mathias, Mathias & Heinz, Cincinnati, O.; W. H. White, Selden Sales Co., Atlanta, Ga.; W. W. Grosser, sales manager Oldsmobile Sales Co., Houston, Tex. The accompanying cut shows members of the advisory council, senate and a few factory workers.

The Selden Truck Corporation was never in better shape than it is today. At the recent annual meeting of stockholders a regular quarterly dividend of two per cent. on first preferred and 2½ per cent. on second preferred was declared payable for the coming year. One of the ideals of this organization is "the dealer first." One of its forward steps is a national and monthly free inspection system of all Selden trucks. A transportation engineering school is another.

This concern also has a strict rule which prevents any dealer from overstocking with trucks.

WHEAT HAULING RECORD.

A motor truck owned by Francis Griffin of Heppner, Ore., broke all records in that part of the country for hauling wheat last fall when it averaged, day in and day out, 112 miles per day, says Griffin in a letter to the manufacturers. The truck was a United States model "N."



Selden Dealers in Convention at Factory as Advisory Council to Management.

HAWKEYE 3½-TON MODEL FINDS FAVOR

The Hawkeye Truck Co., Sioux City, Ia., is receiving many favorable comments on its 3½-ton truck.

This truck has been in production a short time and although the number in service is not large these are showing wonderful results, and letters of approval from the owners have been very gratifying to the manufacturer.

It is the intention of the company to produce this model in larger quantities in 1921 and plans are now being carried out with this idea in view, including additional purchase of raw materials, additional machines and enlarging the plant.

The power plant of the Model N 3½-ton truck is a Buda engine, four cylinders, L head type, 4½x6 bore and stroke, and developing better than 40 actual horsepower, manufacturer's rating, while the S. A. E. rating is given as 32.40 horsepower. The engine cylinders are cast in one piece, while the base is separable, allowing easy access to the base of the engine for tightening rods, bearings, etc.

The valves are of ample size and are located on the right hand side of the engine cylinders, access to them for grinding being through removable plugs in the top of cylinder casting over the valves.

The cooling system consists of a power driven centrifugal pump located at the side of engine and driven by a shaft fastened to a timing gear in the timing gear case. The fan is of the four-blade type, driven by belt from a pulley of ample size on the front end of crankshaft, while the radiator is of the well known cellular type of unusually large dimensions for the size of the engine, and when filled is able to keep the engine at proper working temperature under any and all conditions of work.

Ignition and Carburetion.

Ignition for the engine is obtained from an Eisemann high-tension magneto, equipped with impulse starter to facilitate easy starting of the engine under difficult conditions.

The carburetor is the well known Zenith make, which has been found to be especially adapted to motor truck work, especially under the varying conditions under which a loaded truck is obliged to perform. The manifold fitting between the carburetor and the intake manifold is 1¼ inches in size and provides the engine with sufficient gas at all times.

The clutch is a dry plate type, running without oil and is a unit with the engine, is operated by a separate pedal at the left of the operator, is very easy to operate and is of ample size to transmit the power of the engine to the transmission without slipping or grabbing.

The transmission, is hung amidship, is equipped with four speeds ahead and one reverse, allowing the truck to have great power on first for pulling out of difficult places while under load. All gears are made from the highest grade of steel ob-

tainable and machined to accurate fit. Main shaft and counter shaft operate on frictionless bearings, which tend to increase the amount of power delivered at the rear wheels, an important item where extreme power is desired.

Rear Axle System.

The final drive is through a propeller shaft to a Clarke internal gear axle to pinions and gears in the drums of the wheels. Timken bearings are provided in the wheel hubs, which allow ample bearing surface for carrying the load, and insure long life to the axle construction and a lengthening of the life of the vehicle.

Tire equipment is single pneumatics all around, oversize, and of cord construction, 36x5 in front and 36x10 in the rear. The wheel construction employs the use of disc steel wheels both front and rear. The generator is Westinghouse make and supplies current to the storage battery, which in turn supplies current to the rear and head lights. Each truck is equipped with a power pump to be used in the inflation of the large size pneumatic cord tires, and this pump is connected to the power take-off at the transmission.

The special use for this capacity truck is in service where fast transportation in covering long distances is desired. The gear ratio, 10-1 on high gear, allows the truck sufficient speed within range of the Simplex governor, with which the engine is fitted. Accessibility has been considered in the construction of the Hawkeye truck and as all parts are readily accessible, labor cost when renewing worn parts are reduced to a minimum.

TO RAISE N. Y. TRUCK FEES.

Gov. Miller of New York declares "those who use the roads must pay for them" and a movement is under way to add at least \$1,000,000 to the taxes assessed against owners of cars and trucks. An appropriation of \$15,000,000 for highways in the state has been asked, but this figure may be cut. It is expected that the figure will be well above last year's, which was \$7,500,000.

BOLLSTROM CORPORATION PLANS.

The Bollstrom Motors Corporation, St. Louis, Mich., is planning to take advantage of what the new year brings, its plans including the election of F. W. Crawford as president, an increase in capitalization from \$200,000 to \$2,000,000, and the production of a light speed truck in response to popular demand. These steps were taken at a meeting late last month when the following directors were elected: President Crawford, W. H. Hall, W. E. Barstow and Louis Martin of St. Louis; C. F. Berger of Saginaw, L. M. Russell of Merrill, and W. F. Markham of Alma.

S. A. E. MEETINGS.

The Society of Automotive Engineers, Inc., which held an important and productive session at New York city, Jan. 11-13, is to hold its Chicago meeting at the Hotel Morrison, Feb. 2, and its Columbus, O., meeting at the Hotel Deshler, Feb. 10. The truck will be the chief topic at Chicago and the tractor at Columbus.

HAYNES DODGE PRESIDENT.

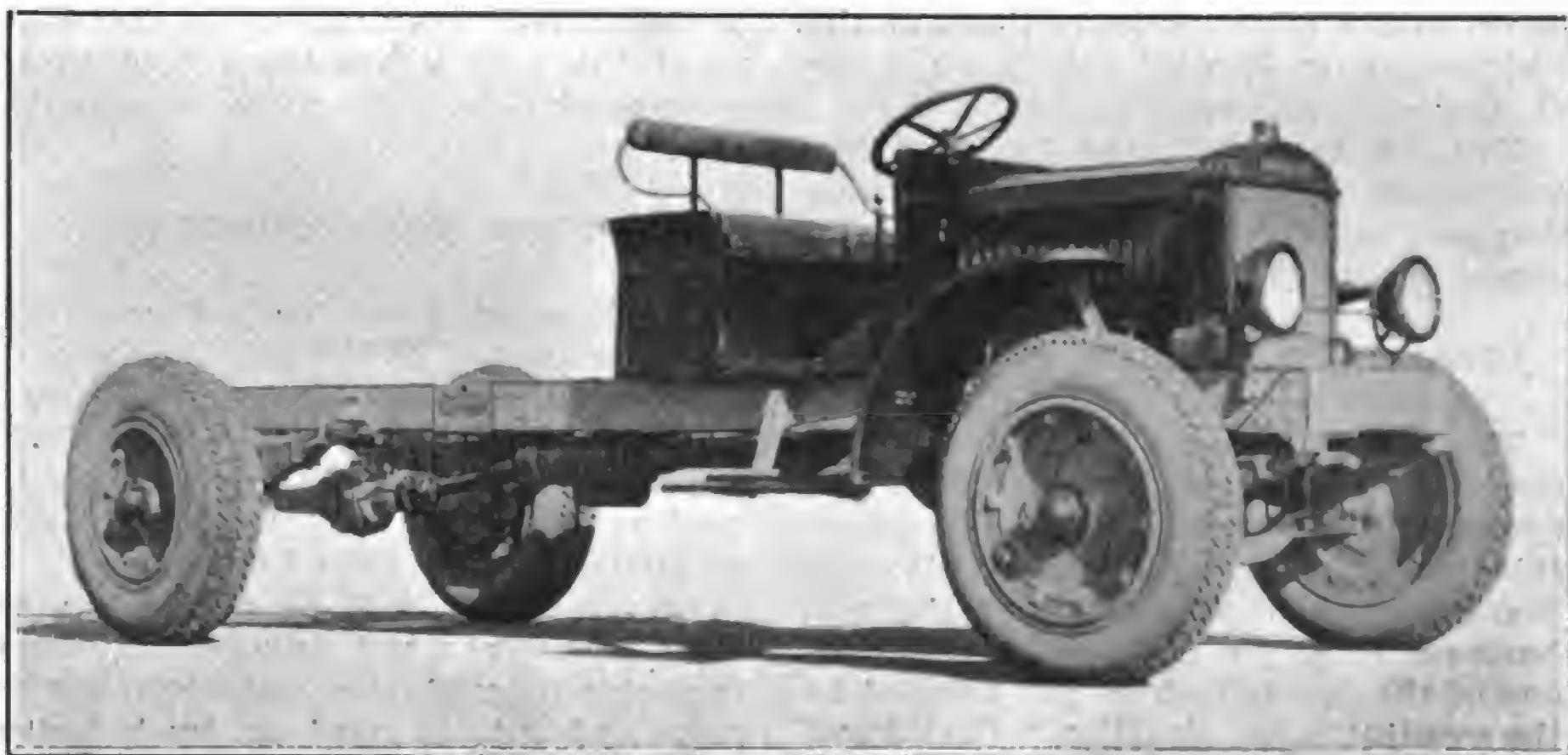
Frederick H. Haynes has been named president and general manager of the Dodge Brothers Automobile Co. He has been connected with the organization for 25 years and has played a big part in its development.

McADOO WITH FORD?

Former Secretary of the Treasurer W. G. McAdoo is being mentioned for the vice presidency of the Ford Motor Co., to fill the vacancy caused by the resignation of Frank L. Klingensmith.

STUDEBAKER CARS ONLY.

The Studebaker Corporation, which had a big year in 1920, is to concentrate all of its future efforts in the manufacture of passenger cars.



Hawkeye Model N, 3½-Ton Capacity, the Production of Which Is to Be Increased.

FACTORY BACKS SALES PUSHING PLAN

A leading truck manufacturer recently decided to cooperate in a practical manner with distributors while sales resistance was strong through the slowing up of industry and it was agreed to back the dealer in offering \$50 to every person who would furnish the name of a prospect who ultimately became a buyer.

There is no doubt that this plan won business. One nice feature in connection with it was that the donor of the prizes could lose nothing without reaping the regular profit on a sale, minus the amount of the award.

Dealers went at the problem of securing prospect lists in various ways. One wrote every postmaster in the outlying sections of his territory asking for a list

of likely truck buyers and offering \$50 to the postmaster for each person on the list who became a buyer. This was the most successful prospect getting plan he tried.

A fair proportion of the postmasters sent in lists and salesmen were sent to interview the prospects. Definite sales were few, but many of those who were seen will be in the market for trucks when business picks up. The salesman who saw these men was the only representative of the industry who has seen them, which means that he will set the pace when they are ready to do the actual buying.

This same dealer made some sales and lined up many future tempting prospects

by putting his proposition before lodge and fraternal society secretaries, a man in each bank in his district, the city editors of the newspapers in his field, a Chamber of Commerce official, the secretary of the truck drivers' union and several individual drivers, including one in each industry.

This offer by the manufacturer has proven a great stimulus to distributors and dealers, putting renewed energy into a number of organizations that had begun to sag and lag. In fact many sales with which the \$50 bonus had no direct connection were indirectly due to the new vigor instilled into the workers by this sales pushing plan. As a digger up of prospects it proves a winner.

WHAT THE TRADE IS PUTTING OUT IN PRINT

"M. & E." CATALOGUE.

The Merchant & Evans Co., Philadelphia, Pa., has issued a new Multiple Dry Disc Clutch and Universal Joint catalogue, which aims to be the best publication on the subject in existence and appears to have accomplished its purpose. From the standpoint of useful information, in quality of material, text matter, instructive cuts, printing and binding, this output is one of the finest that the automotive industry has seen.

Directions are given for mounting and operating "M&E" dry disc clutches. Automotive clutch engineering is fully treated. The "M&E" universal joint for oil and grease lubrication is described to the last detail, as is universal joint engineering. The "M&E" chassis oiling system is thoroughly explained. The drawings are unusually complete and describe the subjects outlined clearly and definitely. Automotive engineers will be particularly interested in this publication. Every user of motor vehicles should have one for the knowledge they contain.

The Merchant & Evans Co. is showing its universal joints, multiple disc dry clutches, grease cups and "Hele-Shaw" clutches at the New York automobile show, and will also display them at the Chicago show, Jan. 29-Feb. 5, in space 61, Coliseum gallery.

The Merchant & Evans Co. is producing 300,000 clutches annually at its Philadelphia plant and 250,000 universal joints annually at its Lancaster factory.

STANDARD AS COAL HAULER.

The Standard Motor Truck Co. has issued an informative folder giving facts demonstrating the utility and economy of this truck in coal hauling. This is a timely document, coming when the coal business is at its peak and when it is one of the few industries not touched by the readjustment situation. Coal handling is a big field and this industry is far from being fully motorized.

A TRUCK TREATISE.

Motor Truck Design and Construction, written by C. T. Schaefer, consulting engineer and member of the Society of Automotive Engineers, is one of the few books on the motor truck from which the engineer, the student, the owner and the operator may alike benefit. The matter is intelligently arranged and put before the reader in a plain and practical way. The construction of the various units is definitely defined so that even the beginner may readily understand. A striking feature of the book is the 292 illustrations, which are a course of instruction in themselves. Motor Truck Design and Construction is published by the D. Van Nostrand Co., 25 Park place, New York city.

WHITES IN OIL INDUSTRY.

"White Trucks in the Oil Industry" is the latest publication by the White Co., Cleveland, O. Among the facts quoted are these: More White trucks are in the service of the oil industry than trucks of any other make; more White trucks are in the service of the oil industry than in any other one industry; in 1919 an average of five new White trucks a day went to work every working day in this business; the first White truck sold to an oil company is still giving dependable service.

\$200,000 BODY CONCERN.

The Calumet Truck Body Corporation has been formed at Calumet, Mich., with \$200,000 authorized capital and will manufacture the Calumet All-Purpose Body for motor trucks. This product may be used as a platform, express, stake, grain or cattle body, or for a hay rack.

This company will be pleased to receive catalogues and prices from manufacturers of malleable and drop forging parts and fittings used on truck bodies and cabs, as well as catalogues and prices on tools and shop equipment.

BURD PISTON RING DIRECTORY.

The Burd High Compression Ring Co., Rockford, Ill., have just issued a new directory of Burd piston rings for 1920-1921 which, it is claimed, is the most comprehensive compilation in existence devoted to the subject of piston rings. It contains 192 pages, measuring four by seven inches, with cover printed in three colors.

This book gives the piston ring dimensions, year, model and number of cylinders for practically all makes and models of passenger cars, trucks and tractors, motorcycles, gas engines, marine engines, air planes, etc., and in addition to the tabulations of sizes it contains much helpful information for ordering, handling and installing piston rings. It contains also valuable tables of standards that every repairer should have.

A copy will be mailed, on request, to any garage or repair shop by company.

GOODRICH'S 50TH BIRTHDAY.

The golden anniversary of the founding of the B. F. Goodrich Co. was recently observed, the event taking the form of a country wide tribute to the memory of Dr. Benjamin Franklin Goodrich, its founder.

The Goodrich company is commemorating the anniversary by publishing an attractive 48-page book called the "Golden Year of Goodrich," telling of the romance of the rubber industry, its history, and what great importance it has been in the progress and development of the world. The book was written by Wilbur D. Nesbit and illustrated by W. T. Benda, the famous Polish-American painter.

The Gary Motor Truck Co., Gary, Ind., has issued a neat pocket size booklet, which contains many illuminating facts concerning the industry in general, as well as pictures of Gary trucks and personal notes of the doings of members of the Gary business family.

New York Truck Show Was Admirably Handled

Motor Truck Association of America, Inc., Gave Splendid Exhibition Against Multitude of Handicaps—Bigger Attendance Last Half of Week Than a Year Ago Despite Business Conditions—Trucks Sold and Prospects Listed.

The outstanding feature of the Highway Transportation Show put on at two New York armories, Jan. 3-8, was the business acumen, the initiative, the untiring effort and the practical handling of the event by its sponsor, the Motor Truck Association of America, Inc.

Staged almost at the peak of the business depression, ignored by the New York press and by some of the trade magazines, backed only by New York dealers, and not too enthusiastically by them, the Motor Truck association put on a show that during the last half of the week drew a greater attendance than did the N. A. C. C. show held when business was at flood tide a year ago.

This herculean performance was due entirely to the fine judgment, the sound sense and the skilled management of those in charge. A show, founded on the same logical programme, conducted in the same careful and competent manner and produced during an era of good times and in the same week as the automobile show would have scored the most brilliant success in the history of the industry.

As it was the show was far from a failure. Sales were made and prospects listed. Their number was not legion, but in these days every one counts. The most valuable outcome of the demonstration, however, was that the world was told that the trucking interests of the nation are not tamely submitting to the backward trend of business, but are up and alive and stand ready to fight for a legitimate share of whatever buying power may be dormant in the land.

The Motor Truck Association of America, Inc., emerged from the event with colors flying. It got all out of its labors that any organization could have achieved. It left nothing undone to present an attractive, modern exhibit of power haulage equipment. That general business is bad, that the press and the trade magazines laid down on the job and that mobs were not herded for the demonstration was not its fault. It did its best and it was as good as anybody's best.

The show was held at the 12th Regiment Armory, 62nd street and Columbus avenue, and the First Field Artillery Armory, 68th street and Broadway. The main exhibit was in the former building, the overflow being at the artillery armory.

117 Models Shown.

The trucks displayed numbered 117, representing 25 different makes. Of these 51 were shown with bodies, an unusually large number. Four manufacturers exhibited 18 trailer models and body makers showed nine models.

Anybody who was in the market for a truck, trailer, body, hoist or accessory of any kind was offered a chance to find out what he wanted. Differing from an automobile show and lacking the same popularity a truck show is a business

Had the dealers been behind the project in real earnest or had the manufacturers been called in to help the proper publicity might have been had. The association bravely announced from the start that it was a dealers' show. The dealers apparently did not give their offspring its due. The U. S. army did its part magnificently.

There are those who maintain that an outdoor "action" show would have gone across big. This would seem the best kind of a show from the drawing standpoint. It would attract a crowd the same as any entertainment. Whether it would be a result getter is another story. Even such an amusement enterprise would have a hard time getting out people in this particular era. When people are not interested in trucks it is hard to get them out to a truck show, inside or in the open.

First Clinton Models.

The Clinton Motors Corporation, 336 Avenue B, introduced its models to the industry for the first time. The Bridgeport Motor Truck Co., Bridgeport, Conn., which has been in production since early last year, also put its wares on exhibition at a show for the first time. The Rainier, Bessemer, Ward-La France and Gramm-Bernstein organizations had models of recent birth on view.

The Clinton line follows: 1½ ton, cylinder dimensions, 3¼x5 inches; wheelbase, 150 in.; 2½ ton, cylinder dimensions, 4½x5¼ in.; wheelbase, 170 in.; 3½ ton, cylinder dimensions, 4½x5½ in.; wheelbase, 190 in.; five ton, cylinder dimensions, 4¾x6 in.; wheelbase, 204 in. All models have four-cylinder Continental engines, Brown-Lipe gearsets and Timken rear axles.

The Bridgeport Truck.

The Bridgeport truck was shown in four models, the capacities being 1½ tons, 2½ tons, four tons and six tons, and the respective prices, \$2350, \$2850, \$3850 and \$4500.

These trucks are made of standard parts. The Buda engine is used in all of them. The rear axle and other parts vary in the different sizes, but all have Ross steering gears and Hartford drive shafts. All have brakes mounted on rear wheels, pressed steel frames, semi-elliptic springs, I-beam front axles with Timken bearings, gasoline tank under driver's seat, left side drive and center

HIGH SPOTS OF SHOW.

Manufacturers Who Displayed Models for First Time:

Clinton Motors Corp., New York City.

Four Models.

Bridgeport Motor Truck Co., Bridgeport, Conn.

Four Models.

Manufacturers Who Exhibited Models Recently Added to Their Line.

Rainier Motor Corp., New York City.

Bessemer Motor Truck Co., Grove City, Pa.

Ward-La France Truck Co., Elmira, N. Y.

Gramm-Bernstein Motor Truck Co., Lima, O.

Bodies Shown on 51 Trucks—66 Displayed with Chassis Only.

enterprise entirely. If people do not care to buy trucks they are not interested in a truck show. Hence the small attendance.

There were moving pictures of trucks at work, lectures by transportation experts, music and other features to hold the interest after the people got inside the building. The job was getting them in.

The press withheld recognition of the show because the management did not come through with the thousands of dollars that would interest these publications.

Some of the trade magazines were cold to the proposition for the same reason.

control. Standard equipment includes driver's seat, front fenders, side and tail lamps, horn and set of tools.

New Rainier Models.

The new Rainier models shown were of 3½ and five-ton capacity. The prices are \$4500 and \$5250. The Continental engine is used in both, as well as the Timken worm drive axle, the Ross steering gear, Zenith carburetor, Brown-Lipe clutch and gearset and Spicer universal joints. The bigger model carries 36x6 tires, front and rear, and the smaller one, 36x5, front and rear.

Ward-La France Five-Tonner.

The Ward-La France people had its new five-ton model on exhibition. The price for this truck chassis is \$5590. Standard parts include the Waukesha en-

gine, Timken worm drive axle, Ross steering gear, Bosch magneto, Long radiator, Zenith carburetor, Brown-Lipe clutch and gearset and Merrill spring. A Westinghouse two-unit starting and lighting system is installed at an extra charge of \$120.

New Bessemer Truck.

The new Bessemer truck shown was of four tons capacity. The price is \$4285. Standard parts are a Continental engine, Torbensen internal gear axle, Bosch magneto, Stromberg carburetor, Pierce governor, Borg & Beck clutch, Perfection springs and Baker gearset. The front tires are 36x6 and the rear 36x10.

The new Gramm-Bernstein one-ton model, on view for the first time, was recently described in MOTOR TRUCK.

An unusual body was exhibited by the Selden Truck Corporation, Rochester, N. Y., this being a glass lined 500-gallon tank for milk hauling. The Selden people also showed the famous Selden "road wagon" of 1877, George Selden's original internal combustion vehicle. Some of the trailer and body exhibits were unusual and attracted special attention.

The following makes of trucks were shown: Atterbury, Bessemer, Vim, Service, Sandow, Brockway, Gramm-Bernstein, Transport, Clydesdale, Jumbo, Clinton, Nash, Rainier, Kelly-Springfield, Moline, Indiana, Ward-La France, Reo, Federal, Parker, Selden, Corbitt, Bridgeport, Riker, Fulton.

The trailers exhibited were: Highway, Adams, Warner, Trailmobile.

MAGNIFICENT GIFT FOR GMC DISTRIBUTOR

Harry K. Noyes, head of the Noyes-Buick Co., Boston, Mass., which distributes GMC trucks and Buick cars in New England from one of the most palatial homes in all the industry, was the recipient early this month of a magnificent present from the company's dealers and representatives, the gift being a mammoth wood carving to adorn the front of the Boston headquarters. The central portion is occupied with a huge chime clock with three sets of chimes. The history and progress of transportation is depicted in the beautiful and intricate carving.

On either side of the clock at the base is a settle, also in dark quartered oak, with a panel at the top. On one side is represented the complete 1921 line of

Buick cars and on the other the GMC trucks of the current models.

NEW DENBY MANAGER.

E. L. Sprague has been appointed manager of the San Antonio, Tex., branch of the Marsh Camp Motors Co., distributors of Denby trucks in Southwest Texas.

NO DES MOINES SHOW.

There will be no truck show at Des Moines, Ia., this year. The Motor Truck Dealers' association of that city has definitely voted against the proposition.

HANDLES NASH TRUCKS.

E. K. Vernon and A. J. May have opened a garage at Allen, Okla., and will handle Nash trucks and cars.

ELECTRIC VEHICLE SHOW.

Arrangements for an unusual electric automobile display to be held this winter are being made by the New York Edison Co. The big show room of the company at Irving place and 15th street has been set aside for the purpose, and manufacturers of electric trucks, industrial trucks, passenger cars, and batteries and accessories have been invited to exhibit their products.

Street trucks and passenger cars will be shown during the week of Jan. 29-Feb. 5, while industrial trucks will hold forth during the following week. Batteries and accessories will be on display during the two weeks.

The show will be given under the auspices of the New York Edison Co., Charles R. Skinner, Jr. of the Automobile Bureau being in charge of the arrangements.

U. S. TRUCKS IN ST. LOUIS.

The United States Trucks Sales Co. has been formed at St. Louis, Mo., to distribute the U. S. truck in that district. The new company's headquarters are located at 1610 Locust street. J. F. Mackey, a banker of Centralia, Ill., and head of the Marion County Automobile Co., is president of the company.

DISTRIBUTING BELL TRUCKS.

The Rudd Motor Truck Co., Kansas City, Mo., headed by J. C. Rudd, a former Colby, Kan., dealer, has taken over the distribution in that territory of the Bell truck, manufactured by the Iowa Truck Co., Ottumwa, Ia.

TRUCK SHOW IN PHILLY.

The Motor Truck association of Philadelphia has appointed a committee to investigate the possibility of engaging a building large enough to stage a truck show early this year.

51,386 BAY STATE TRUCKS.

The truck registration in Massachusetts last year was 51,386, against 43,919 the previous year.



Harry K. Noyes, President and Treasurer of Noyes-Buick Co.

THE NEW INTERNATIONAL SPEED TRUCK

The International Harvester Co., Chicago, Ill., announces that it is putting into production a new speed truck for delivery purposes, having a capacity of from 1500 to 2000 pounds.

The new model is the outgrowth of experience gained throughout the trade by an earlier model built by this company and although this earlier model has gained many friends in all lines of delivery during the length of time it has been on the market, still the International Harvester company feels that the new model will meet with instantaneous success wherever shown and anticipates that the call for this truck will be very heavy during the coming year.

This truck is intended primarily for delivery purposes where loads of three-quarters of a ton are to be carried constantly at speed. The truck is designed with this idea in mind, and is constructed throughout on rugged lines so that in case of overloading up to 1½ tons no harm will come to the chassis or its units.

Cord pneumatic tires, 35x5, are used on all four wheels and these are over-size for the class of work for which the truck is intended.

The new truck is driven by a 3½ by five-inch bore and stroke Lycoming Special, International designed engine, N. A. C. C. 19.6 horsepower, while the cooling system consists of a fin tubed radiator located in front of the engine, the water

circulating on the thermo-syphon principle. The carburetor in the new truck is an Ensign, having a manifold fitting of 1¼ inches.

The ignition consists of a Connecticut, single unit, with hand spark advance lever located on the steering wheel. The Auto-Lite starting and lighting system is used and is included in the equipment at the regular price.

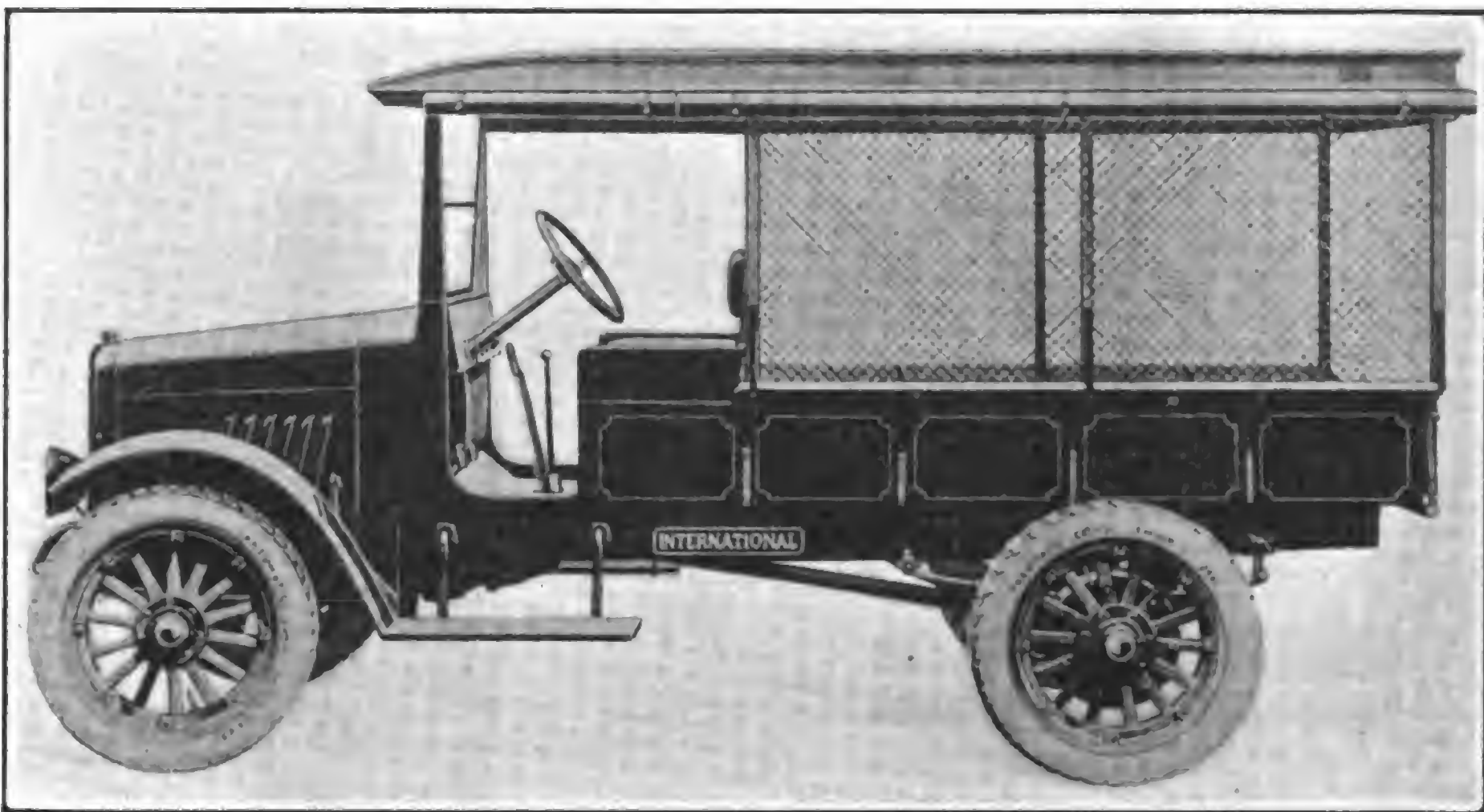
The cylinders are cast en bloc and the transmission and clutch are in unit with the engine.

The clutch is a dry plate multiple disc

operated by the usual foot pedal, while the transmission adjoining the clutch is of the three speed forward and one speed reverse type.

The drive from the transmission is through a propeller shaft to bevel gears at the differential, to separate live driving members in the Torbensen special International designed axle, to pinion, meshing with a gear in the drums of the wheels.

The wheelbase of the truck is 124 inches. The price is \$1500 f. o. b. Springfield, O.



International Speed Truck, Designed Especially for Delivery Purposes.

TRAILER MANUFACTURERS' ASSOCIATION HAS ANNUAL MEETING

Two new officers and members of the executive committee were elected at the annual meeting of the Trailer Manufacturers' Association of America, held at the offices of the association in Grand Central Palace, New York, on Jan. 6.

J. H. Fertig of Newark, N. Y., president, and H. C. Fruehauf of Detroit, first vice president, were re-elected. Max Herrmann of Beloit, Wis., was elected second vice president to succeed C. H. Martin of Springfield, Mass., and Henry M. Wood of Cincinnati was elected secretary-treasurer to succeed J. C. Endebrock of Cincinnati. Mr. Herrmann and Mr. Wood were also elected to serve on the executive committee.

A code of ethics in trade practises was adopted as an amendment, as a preventive against the creeping into the industry of any objectionable methods that might lead to lack of harmony within the organization.

The patents committee was enlarged by appointment of W. E. Ferris of Cleveland and I. S. Byrum of Troy, O., to serve with C. H. Martin of Springfield, J. W. Menhall of Edgerton, Wis., and Max Herrmann of Beloit, Wis. The committee was instructed to make a study of the patent situation and strive to find

some plan whereby litigation between members may be avoided, thereby promoting harmony and conserving energies and resources of members which can better be expended in developing the manufacture and sale of trailers.

The standardization committee was continued, with instructions to pursue its investigations and make recommendations to the next members' meeting for standardization of trailer axles and trailer hitches.

It was believed that solution of some of these problems would be easier in the present state of the industry than after it has got into greatly increased production, more settled conditions as to designs and methods, and patents have multiplied in number and value.

C. R. Alling of the Underwriters' Laboratories, addressed the meeting on the subject of premium rates on collision, property damage and liability insurance on trailers as affected by design and safety devices.

A number of members expressed a desire to participate in a national outdoor exhibition and demonstration of motor trucks, trailers and material handling machinery in event that plans for the promotion of such an event begin to take shape in the motor vehicle industry.

Representatives of the following companies attended the meeting: Arcadia Trailer Corporation, Newark, N. Y.; Eagle Wagon Works, Auburn, N. Y.; Fruehauf Trailer Co., Detroit, Mich.;

Highway Trailer Co., Edgerton, Wis.; F. P. Lyons, Inc., Manchester, N. H.; Martin Rocking Fifth Wheel Co., Springfield, Mass.; Northway Trailercar Co., Rochester, N. Y.; Shadbolt Mfg. Co., Brooklyn, N. Y.; Trailmobile Co., Cincinnati, O.; Troy Wagon Works Co., Troy, O.; Warner Manufacturing Co., Beloit, Wis.

CLYDESDALE SERVICE.

The Clydesdale Motor Truck Co., Clyde, O., has inaugurated day and night service for Clydesdale owners at the service station, conducted in connection with its Chicago branch. A total of 10,000 square feet of floor space is devoted to this department. Over \$55,000 worth of service parts is carried in stock. This branch is managed by J. F. Jones, with Harry M. Keefer as service manager and Walter D. Glenn as sales manager.

BOSTON TRAFFIC AGENCY.

The Traffic Sales Corporation has been organized at Boston, Mass., to handle Traffic trucks. Sales and service quarters have been secured at 961 Commonwealth avenue, near the Boston National league baseball grounds. Many of these trucks are already giving good service in New England. The executive officers of the new organization are John L. Brooks, John Woods and Richard McGann.

New Motor Truck Accessories

TREX HYDRAULIC JACK.

The Trexler Co., 1418 Walnut street, Philadelphia, Pa., offers a new jack for trucks which it has developed after a period of experimenting which is advertised as far superior to any article of its kind. The Trex Hydraulic Jack is stated to be a smaller edition of the ponderous jacks of this type manufactured by this company for lifting heavy machinery. The device consists of a cyl-



inder containing a plunger, which is operated by a lever at the side. Liquid is contained in the base, preferably an oil, which will withstand low temperatures, and this oil operates the plunger in the large cylinder. Provision is also made for lowering the jack in a simple manner when the operator wishes to remove it from under the axle of the vehicle. When not in use the jack occupies but little space in the tool box.

RAJO MODEL 30, VALVE-IN-HEAD.

The Rajo Motor Co., Racine, Wis., manufactures a valve-in-head arrangement for Ford engines which greatly increases the amount of power which may be delivered from the Ford engine. This device is especially desirable where a Ford engine is used in truck work.

The device is equipped with a larger water carrying space in the head jacket, while the exhaust pipe is made in one piece and contains a by-pass and pipe, which carries the hot gases from the exhaust to a jacket on the intake manifold and heats the gas before it enters the combustion chambers. The valves are of large size, made of Tungsten steel, carefully machined and practically unbreakable. The push rods are of solid rolled steel, fitted with hardened steel concave head, which retains the oil and greatly lessens the wear and friction. It is stated that the power of the Ford engine is increased between 30 and 40 per cent. through using the Rajo equipment.

The claim is made that the Ford car is thus enabled to reach a speed of from 50 to 60 miles an hour, if desired.

LA FRANCE FIRE EXTINGUISHER.

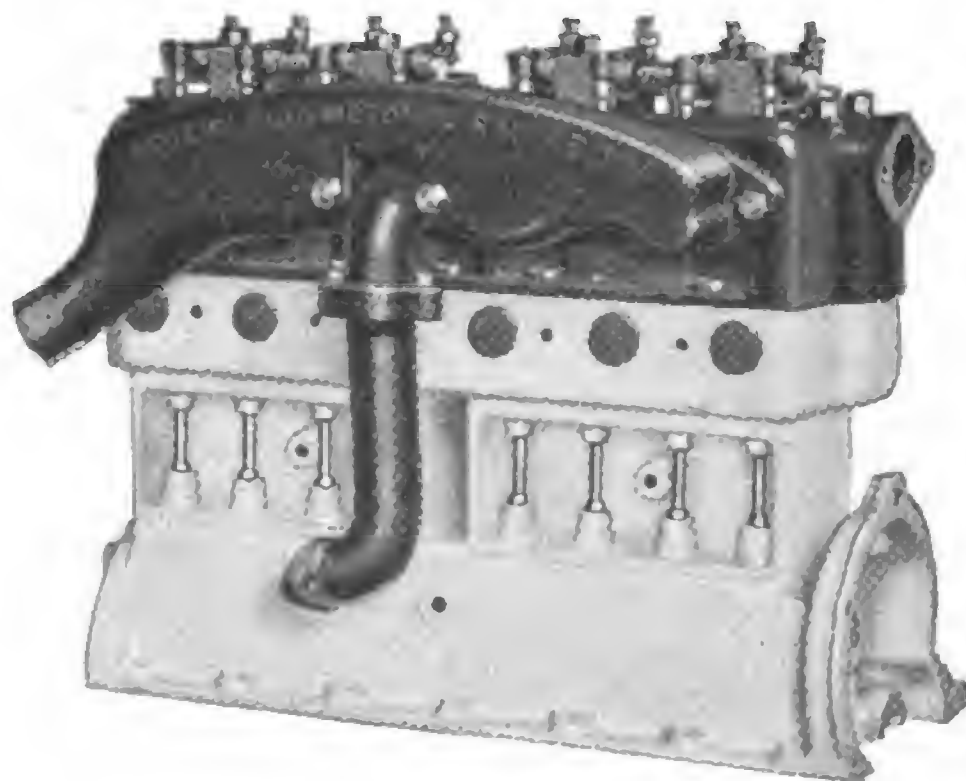
The American-La France Fire Engine Co., Inc., Elmira, N. Y., has designed a special No. 3 fire extinguisher for truck use which has been developed, it is stated, for instantaneous and rapid action from the first pull to the last push of the handle. Soldered joints are eliminated in the construction of the extinguisher and the probabilities of corrosion are reduced to a minimum. Accidental dents in the walls of the extin-



guisher, it is claimed, will not hinder the perfect working of the device.

CINCINNATI DRAG LINK.

The Cincinnati Ball Crank Co., Cincinnati, O., has designed a special drag link for passenger cars and trucks. The link is made of the highest grade material throughout and special features are embodied, which the manufacturer claims, make it necessary to fill the bearings once a year with lubricant. A long wick is drawn through the plugs at either end, and the manufacturer states that regardless of the position which the link holds, positive lubrication is had.



POMEROY'S PATENTED GASAFIER.

The B. H. Pomeroy Electrical Works, 118 Ridgeway avenue, Rochester, N. Y., manufactures a patent Gasafier which is



placed in the truck engine intake manifold between the carburetor and the manifold. The device is heated by electricity either from ordinary dry cells or from a storage battery, and assures the introduction of dry gas to the combustion chamber, it is claimed, without the possibility of raw gasoline getting into the chamber and not being exploded, or cutting the lubrication of the oil in the cylinders, or the formation of carbon.

The device may be easily installed in a few minutes time by a repairer and proves a useful feature of the engine especially during cold weather.

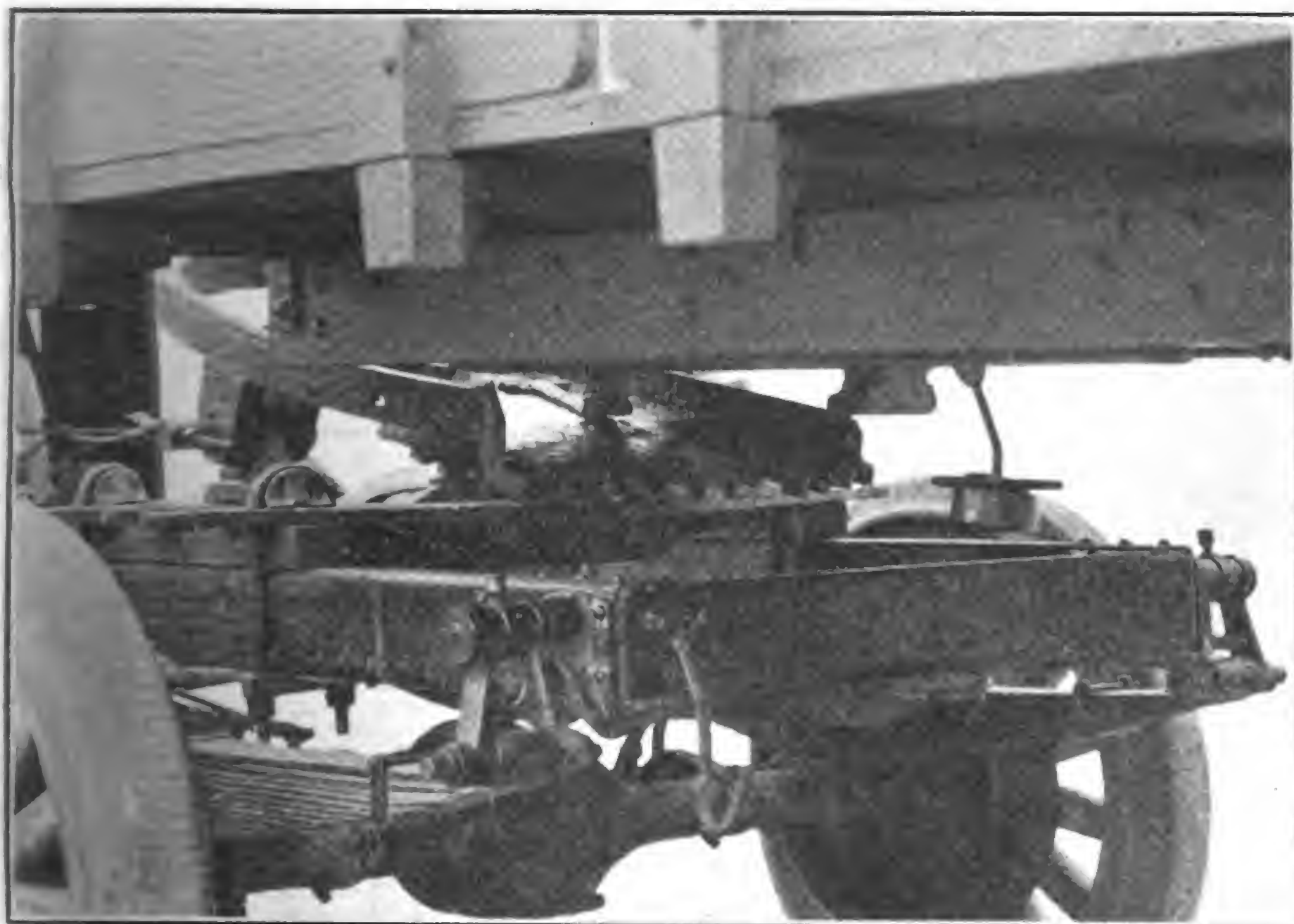
AUTOMATIC LUBRICATION BY THE VANOILER.

The Advanced Products Corporation, Philadelphia, Pa., is showing its new product, the Vanoiler, which marks a distinct advance in lubrication of motor trucks and passenger cars.

The Vanoiler replaces the old style grease cup on slow moving bearings,



MIAMI TRAILER, BRAKE AND COUPLER



Close View of the Automatic Coupling Device Which Is Proving So Effective on Miami Trailers.

The Miami Trailer Co., Troy, O., announces a new development in the trailer industry through the production of an automatic coupling device and an electric brake. These devices make possible and convenient, in inter-factory and inter-terminal hauling operations, the application of the shuttle system of transportation whereby one truck handles two or more trailers and is not compelled to wait while loading is being accomplished.

Highly successful tests over a period of two months have demonstrated that a two-ton truck and a six-ton trailer, equipped with the automatic coupling device, will do the work of a six-ton truck, minimizing operating expenses and eliminating much of the overhead due to waste in time in coupling and uncoupling tractor and trailer under the system now in vogue.

Under the critical eyes of expert engineers and in the presence of a score of

industrial leaders and factory executives, the tests were carried out and the burden of enthusiastic comment has been "It's just what we have been waiting for."

In the operation of the new semi-trailer, the driver without leaving his seat, can couple and uncouple the truck instantly, the construction of the automatic device at the same time being absolutely fool proof in that no mistake or misjudgment of the driver could have the effect of dumping the load or damaging the trailer.

In addition to the automatic coupler, the new semi-trailer is equipped with an electric brake operating on the wheels of the trailer and controlled by push buttons on the truck steering wheel, the power being furnished by a storage battery under the driver's seat. Plungers, operating on springs on the front of the trailer and the rear of the fifth wheel of

the truck form the connection through which power is transmitted from battery to brake. So powerful is the brake that the entire truck and trailer load can be held on any incline without resort to the truck foot brake.

Side rock is eliminated in the new semi-trailer by reason of the operation of the fifth wheel, which pivots laterally on a traction ball center and two friction shoes in circumference. Shock springs take up the jar on the uneven roadways, protecting and prolonging the life of the truck. The fifth wheel is adaptable to any truck frame without any adjustment being required.

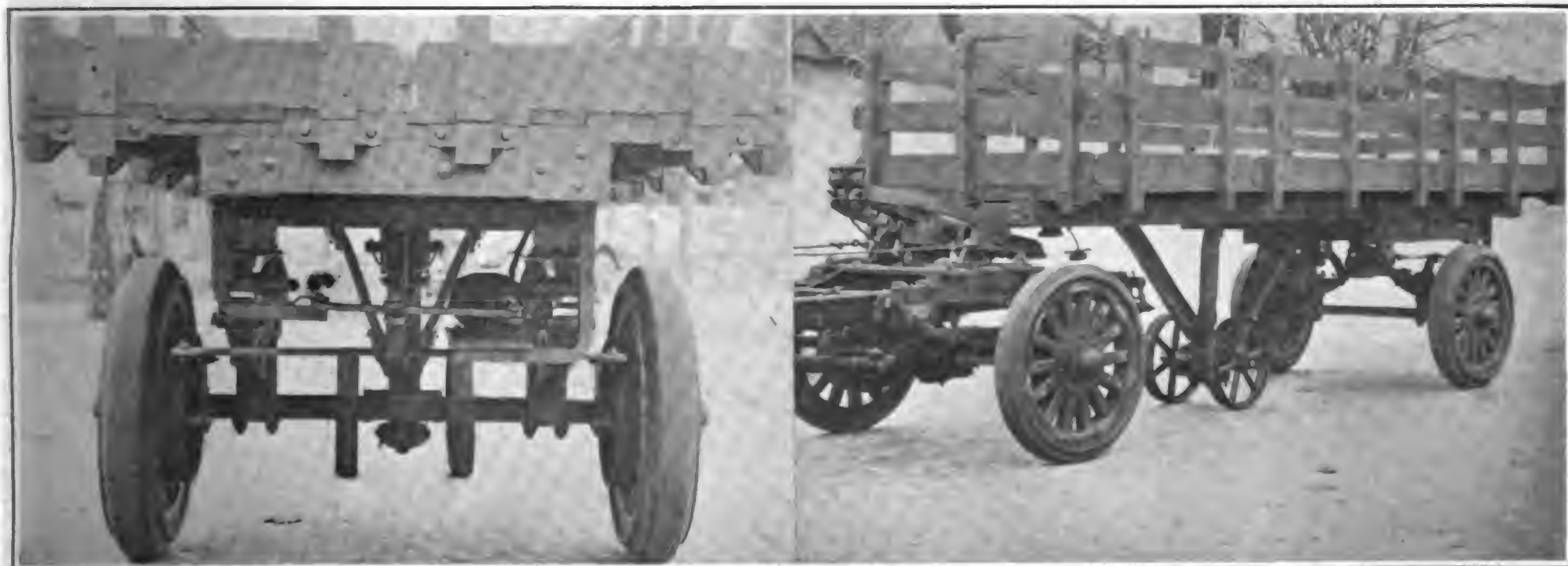
Couples at Any Angle.

The fan-shaped entrance to the coupling slot permits of the coupling of the trailer at any angle, teeth in the fan-shaped plate allowing pick-up no matter at what angle the truck is backed into the trailer. The coupler engages itself automatically behind the traction boss on the upper side of the fifth wheel when the same is engaged fully in the middle section.

In uncoupling, the automatic trailer is depressed by a trigger, operated by a cable from a hand wheel at the driver's seat. When the coupler is depressed the truck leaves the trailer and the jack drops automatically into carrying position beneath the trailer; the jack reaching the carrying position before the trailer is released fully from the truck fifth wheel.

In coupling, the truck is backed beneath the trailer, the traction boss riding over the coupler deflects it and when the traction boss has passed the coupler springs into position.

The cable operating the automatic jack lift is engaged automatically between the fingers of the segment on the rear of the fifth wheel and the jack is hoisted into traveling position as the coupling is being made. Should the jack wheel drop into a depression there is sufficient pickup in the fifth wheel to raise the trailer on to the truck and on a bump in the road a series of teeth in



Two Views of Miami Trailers, Showing the Working of the Automatic Coupling Device and Electric Brake.

the rack holding the jack carriage automatically lock the jack in position to conform to the road surface.

May Be Used with Wagon.

An added feature of importance is a sleeve provided in the jack wheel bracket to receive a tongue, permitting the trailer to be moved about a loading platform or yard by team while the truck and other trailer are being used in delivery.

By means of the two-ton truck and six-ton trailer, the load is carried on six wheels, four truck and two trailer, conforming in greater measure to state requirements than an oversize truck, while the governed speed is much greater than with the large capacity truck, allowing increased mileage and minimizing the upkeep.

Using three trailers in the shuttle system the expense of two trucks and two drivers is eliminated, to say nothing of the cost of oil, gas and truck depreciation.

The brake motor being reversible permits release of brake instantly and the brake application is graduated to any degree of power. It is impossible for the brake to leak off while the trailer is uncoupled, but it may be released by hand when it is desired to move the trailer without the truck. The battery makes a generator on the truck unnecessary.

One of the most important advantages of the automatic coupler from the safety first standpoint is the fact that the leg wheels drop into position automatically in the event of an emergency, in which the truck and trailer are uncoupled, though the mechanical construction is such as to make that contingency very remote.

The device has been pronounced by experts the last word in mechanical construction designed to save time and cut costs, and is assured an enthusiastic reception by big business everywhere.

The Miami Trailer Co., which is headed by J. M. Rebholz and includes in its directorate leading figures in the trailer industry, starts quantity production of the new semi-trailer this month, simultaneously with a nation wide advertising campaign to acquaint the public with the importance of the invention.

The D. D. Richardson Co., Oklahoma City, Okla., distributor for O. K. trucks, has named Don Harris sales manager.

HEIL CO. PLANT NOW LARGEST OF KIND IN THE WORLD

A large addition, now in the last stages of completion, gives the Heil Co., Milwaukee, Wis., the largest steel dump body and hydraulic hoist plant under cover in the United States. The Heil company is planning for a record year of business and is equipped to conduct its activities on a greater scale than ever before.

The new addition, which is 136x250, adds 35,000 square feet to the present manufacturing capacity, making a total of 250,000 square feet of floor space. This is under 10 huge cranes, seven of which are now in operation. New machinery has been installed for the making of bodies, the equipment being modern and complete in every respect.

UNIFORM TRAFFIC LAWS.

Indorsement by 19 national organizations of a comprehensive code of principles of regulation of highway traffic was announced Jan. 13 at the conclusion of a conference at Washington, D. C., to consider greater uniformity in state and municipal traffic laws.

The conference recommended regulations prohibiting issuance of a license for operation of motor vehicles to any person under 16 years of age, and set the minimum age for a chauffeur's license at 18 years. The conference agreed that motor vehicles licensed in one state should be permitted to operate in another state without license thereunder for three months.

Heavy penalties were recommended for such offenses as operating a motor vehicle while under the influence of liquor, reckless driving and for the theft of motor vehicles.

Organizations indorsing the principles included the American Automobile association, Federal Highway council, International Association of Chiefs of Police and National Safety council.

U. S. RUBBER DIVIDEND.

The U. S. Rubber Co. on Jan. 6 declared its regular quarterly dividends of \$2 a share on both common and first preferred stock. They are payable Jan. 31 to stockholders of record Jan. 15.

NEW U. S. TRUCK DEALERS.

The United States Motor Truck Co., Cincinnati, O., has recently closed a number of important distributor contracts.

A contract was recently closed with Gallet & Cie, Lamentin, Martinique, by which this organization becomes U. S. dealers in the Island of Martinique.

L. R. Martin of West Frankfort, Ill., has taken on the sale of United States motor trucks as a dealer under the direction of the Marion County Motor Co., distributors at Centralia, Ill.

James M. Osten of Norwich, Conn., is now handling the U. S. line in that section.

A contract recently signed gives the exclusive sale of United States motor trucks in Winston County, Ala., to T. P. Rice of Double Springs, Ala.

The Harrisburg Garage, Harrisburg, Ill., has contracted to sell U. S. in Saline County, Ill., under the direction of the Marion County Motor Co.

The Immick Co. of Meriden, Conn., is a new U. S. dealer in that section, and will cover Southington, Cheshire, Wallingford and Meriden, as well as taking over all business in Middlesex county.

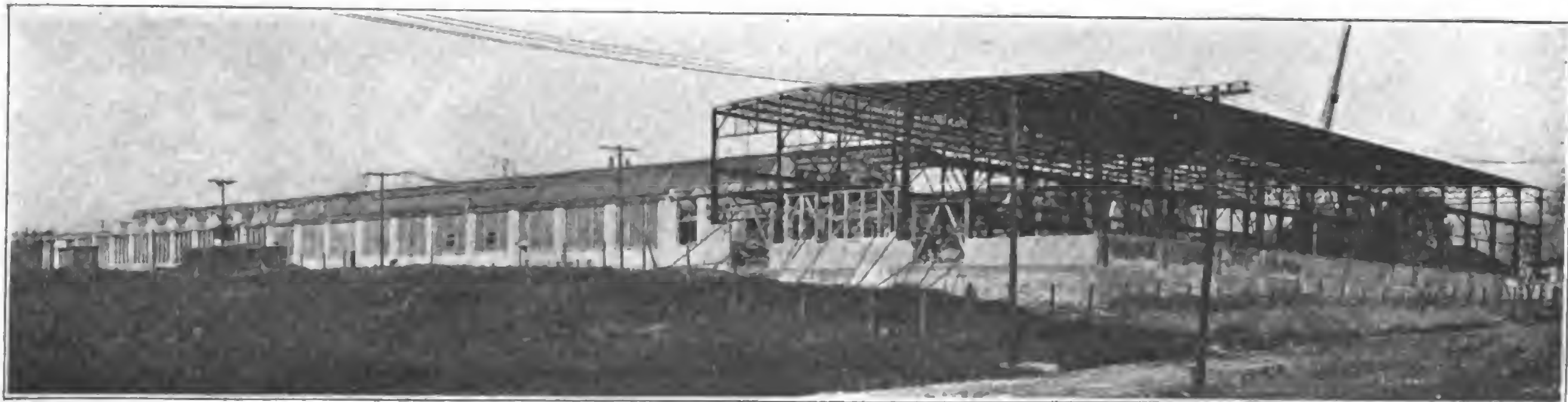
W. M. Thomas, R. F. D., Norfolk, Va., will act as a sub-dealer under the direction of the Baker Auto Sales and Repair Corporation, Newport News, Va., and Norfolk, selling in Princess Ann county.

The Knab Motor Car Co., Belleville, Ill., will sell in Belleville and adjacent territory, acting as sub-dealers under the Marion county organization.

The Virginia territory is being pretty well covered these days. As a result of a contract recently signed between the Baker Auto Sales & Repair Corporation of Norfolk, the Elkton Garage of Elkton, Va., will cover that city and the counties of Rockingham, Page and Shenandoah, in Virginia, as sub-dealers, operating under direction of Baker organization.

DENBY ST. LOUIS HOME.

The Boehl Motor Truck Co., recently formed at St. Louis, Mo., to distribute the Denby truck, has just moved into its permanent headquarters at 3104-6 Locust street. The officers of the company are: President and treasurer, J. L. Boehl; vice president, P. H. Fuchs; secretary, T. Wagner; sales manager, H. Teichman.



Latest Addition to Plant of Heil Co., Milwaukee, Wis., Which Makes This the Largest Steel Dump Body and Hydraulic Hoist Plant in the World.

NEW LUEDINGHAUS 1-TON TRUCK

The Luedinghaus Quality Motor Trucks people of St. Louis have now added to their line of 1, 1½ and 2-2½ ton trucks a one-ton job that meets the need which has long existed for a one-ton truck of light weight, designed to stand heavy duty service and capable of maintaining an average speed of 30 miles per hour.

It is built on the same standard of Luedinghaus quality that is the basis of all Luedinghaus trucks and they claim for it minimum operating cost and unusual performance remarkable for a one-ton unit.

It is electrically equipped in every detail, including electric starter, and with electric lights in front and rear. Pneumatic tires are standard equipment.

Extensive plans have been adopted for featuring this new one-ton truck. Distributors are being rapidly signed up for new territory and a prosperous future is predicted for the entire Luedinghaus tire.

It was only with the last two years that the Luedinghaus-Espenschied Wagon Co. of St. Louis began the manufacture of Luedinghaus Quality Motor Trucks. It still makes the celebrated Luedinghaus wagon, which has been considered standard in its line for the past 78 years, the company having been established in 1843.

The Luedinghaus company owns its own plant, occupying several acres in the heart of the industrial district of St. Louis, and the head of the business is Henry Luedinghaus, son of the founder.

Some of the specifications of the new truck are as follows:

Motor—Four-cylinder, 3½-inch bore by five-inch stroke. Powerful and quiet and economical in operation.

Radiator—Built up type. Large copper core, with verticle copper tubes, supported at right angles and vertically by copper honeycomb fins. Metal housing made of four distinct castings.

Clutch—Borg & Beck 10-inch. Dry plate disc, non-slipping, easily adjusted.

Frame—Channel steel, heat treated, four-inch section.

Transmission—Grant Lees. Built in unit with motor. Gears and shaft of nickel steel, heat treated, three speeds

forward and one reverse.

Wheelbase—130 inches.

Front Axle—Heavy drop forging, I-beam, Timken roller bearings.

Rear Axle—Worm drive. Special speed wagon type axle.

Brakes—Two expanding brakes. Very efficient.

Steering Gear—Worm and nut type of adjustment, 18-inch hand wheel.

Springs—Electric furnace alloy steel, with bronze bushing. Front, 2¼x40 inches; rear, 2½x50 inches.

Wheels—Artillery type. Second growth hickory, 12 spokes, front and 14 rear.

Tires—33x5 front, 35x5 rear. Pneumatic cord.



Luedinghaus One-Ton Truck for Which Speed of 30 Miles an Hour Is Claimed.

MAKING NEW TRUCKS OUT OF OLD

With the knowledge that axles, wheels, frame, frame casting, gasoline tank, steering gear, radiator, carburetor and magneto, transmission case, clutch housing and other parts of a motor truck are as good at the end of four or five years as when the vehicle is new, the Acason Motor Truck Co. has informed its dealers of its new plan of reconditioning trucks. These trucks get the same factory guarantee as the new ones and have all the elements and sturdiness of a new machine. This development prevents much valuable material from going into the junk pile and means equal dollars to the owner.

Locomotives are reconditioned at regular intervals, and by this means the life of the railway locomotive is almost indefinite, some engines being in active service for 20 or 30 years. The same policy is applicable to motor trucks.

The work of general overhauling a truck can be handled by dealers, but the work of reconditioning, which is quite different, is a factory operation. It begins with the entire dismantling of the chassis and the inspection of all parts, the rejection of those that are imperfect and their replacement by new parts, the reassembling of the chassis and the

same road test and final inspection and factory guarantee as goes with a new machine.

The result of this is that the reconditioned machine goes back to its owner ready to make a fresh start.

The Acason company will undertake this work at the factory and on trucks owned in the vicinity of Detroit. is prepared to give immediate estimates of the cost of such work, and on trucks that are located at a distance from Detroit is willing to send an expert to inspect and make an estimate, providing that if the truck is sent for reconditioning there will be no charge for the time and expenses of the expert appraisal, but if it is decided not to have the work done, the customer is to pay the traveling expenses occasioned by the expert's trip for that purpose.

The work of reconditioning a used truck is a much bigger proposition than what is usually meant by an annual overhauling, and can only be properly undertaken by the factory that originally built the truck.

Reconditioning calls for the following:

1. All cylinders to be rebored and standard over-sized pistons fitted, with the understanding that if the

motor needs a very large number of new parts in order to put it in first class shape, with a consequent considerable cost, in some instances it is more advisable to install a complete new engine.

2. Brand new tires should be fitted on all wheels.

3. All springs should be renewed and all parts, including transmission gears that are not as good as new, should be replaced by new parts.

4. The testing of a reconditioned truck should be as exhaustive in all respects as the testing of a new machine.

5. The factory should give its original guarantee as given on a new truck covering any machine reconditioned at the factory.

VIM KANSAS CITY BRANCH.

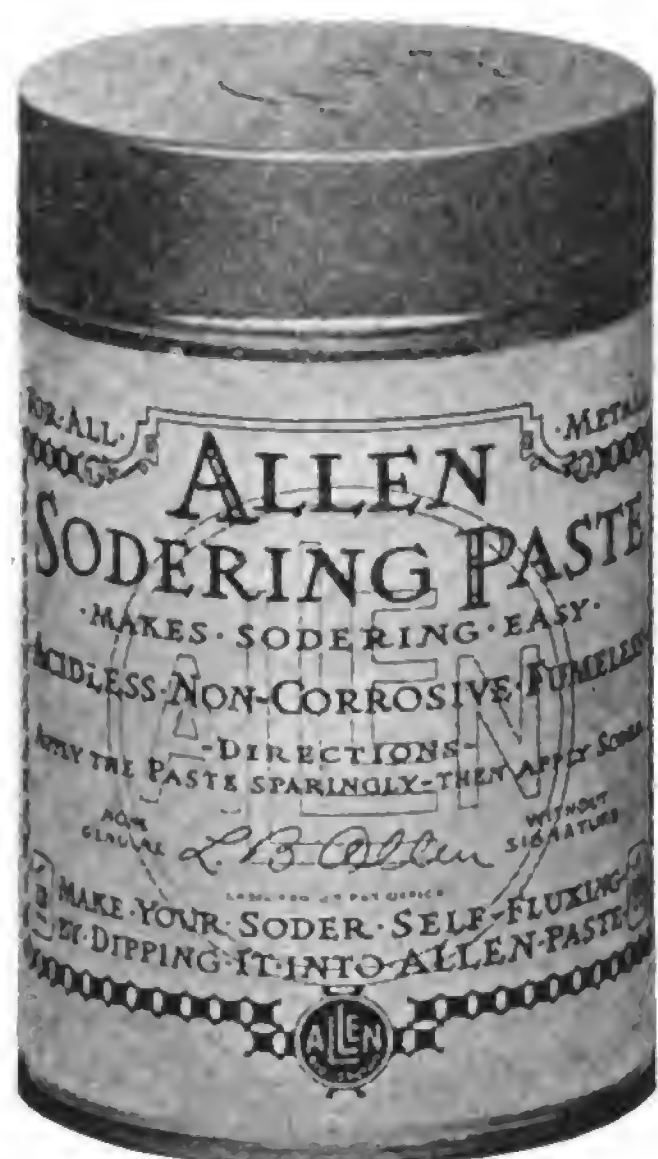
The Vim Motor Truck Co., Philadelphia, Pa., established a factory branch in Kansas City this month.

Master Trucks, Inc., has placed Albert I. Dutton, factory sales manager, in temporary charge of a factory branch, sales and service station at Chicago.

Garage and Service Station Machinery Tools and Equipment

ALLEN'S SOLDERING PASTE.

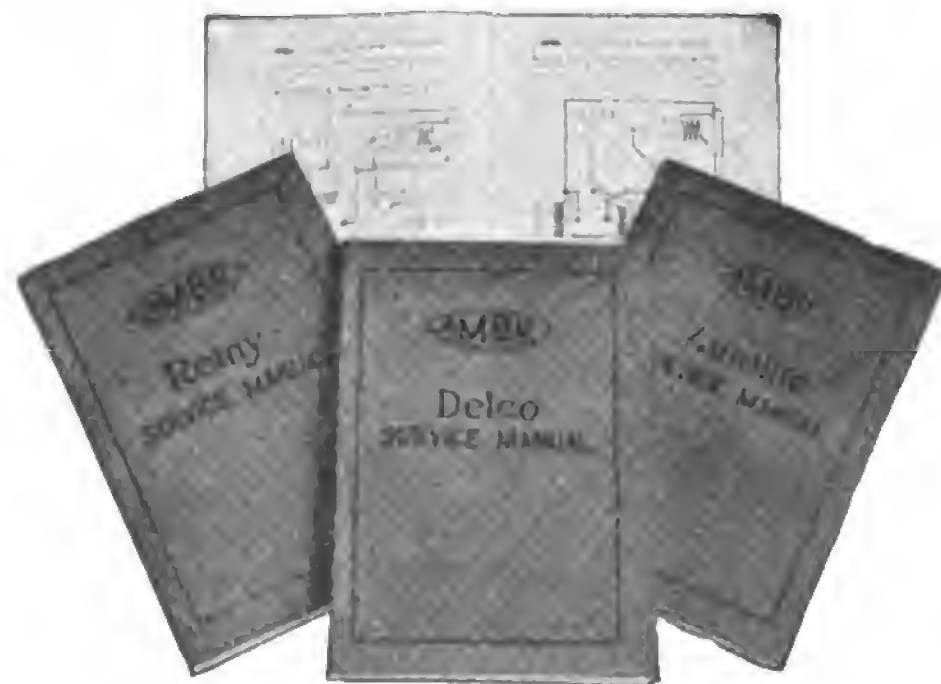
The L. B. Allen Co., Inc., 4521 North Lincoln street, Chicago, Ill., manufacture a soldering paste for radiator repairers and general service station use that is claimed to be unsurpassed. This paste may also be obtained in stick form, but is put up in paste form for easier application and adheres to the surface while soldering is being done. Several other articles for solder's use are manu-



factured, including Alumni-Flux, Alumni-Solder, Alumni-Weld Flux, Non-Acid Soldering Fluxes, Soldering Stick, Soldering Salts, Soldering Liquid and Allen's fountain pen for liquid fluxes and Allen's Commutator Compound.

AMBU SERVICE MANUALS.

The American Bureau of Engineering, 1601 South Michigan avenue, Chicago, Ill., now issue a series of Ambu Service Manuals which contain working drawings of various starting and lighting systems in use, and also complete data. The information given is classified and indexed in such a manner that the repairer finds it easy to locate and find the exact information which he wishes in the shortest possible time. A postal will bring full information how these manuals may be obtained.



AUTOMOTIVE BRAND OVERALLS.

The Ohio Garment Co., automotive department, Springfield, O., manufactures a line of overall garments for the serv-

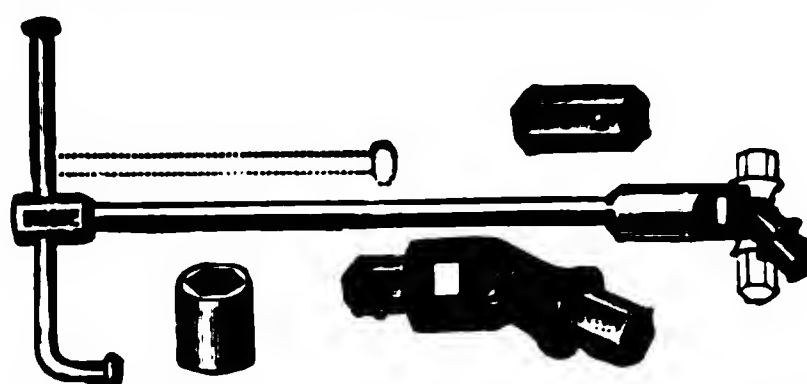


ice station repairer which offer many unique features.

The garment is slipped on over the regular clothes and thoroughly protects the clothes of the repairer. A belt is fitted at the middle which protects the worker when working around power driven machinery in the repair shop. Numerous pockets are supplied, allowing the repairer to carry small tools and personal belongings, while the garment is heavily stitched and made of extra strong wearing material.

LANE'S SOCKET WRENCH SETS.

The Will B. Lane Unique Tool Co., 180 North Dearborn street, Chicago, Ill., shows a very complete line of socket wrenches for the service station repairer which offer many unique features.

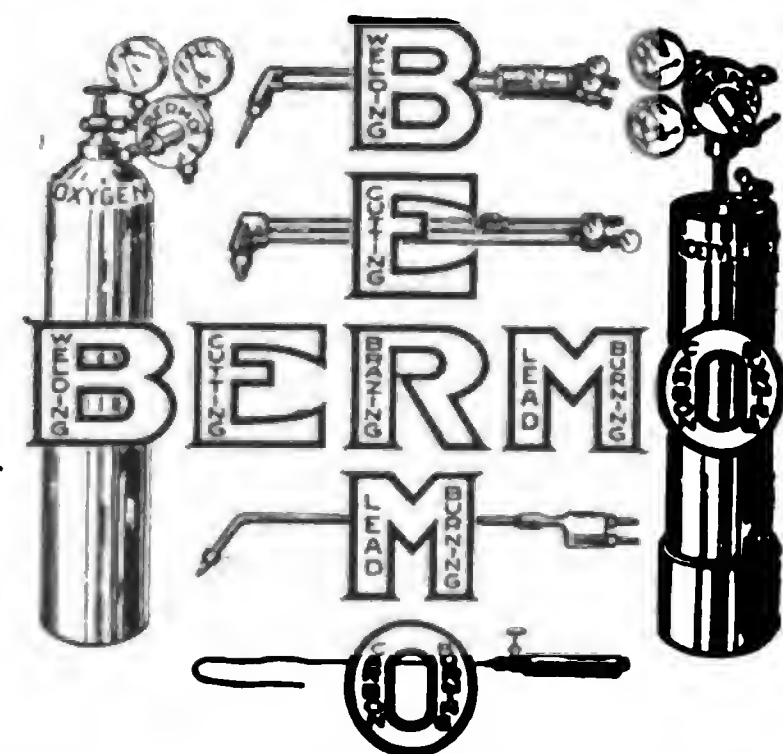


The style A set is for use on engines where the nuts are located in difficult positions, and by means of the universal joint and handle are easily reached for loosening or tightening. The style C set of wrenches also includes additional sockets for regular repair work about the engine and chassis of motor vehicles.

BERMO WELDING APPARATUS.

The Bertschy Engineering Co., Cedar Rapids, Ia., manufacture a very complete line of welding apparatus for service

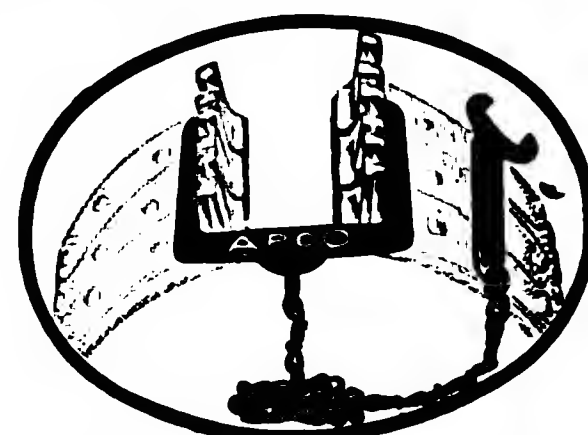
station repairers and includes apparatus for welding, lead burning, cutting, brazing and decarbonizing. All Bermo ap-



paratus is guaranteed for one year and liberal terms of credit are given which enables the purchaser to pay from the profits of the business.

NEW APCO TRANSMISSION TOOL.

The Apco Manufacturing Co., Providence, R. I., is showing a new transmission tool for the Ford which simplifies the work of removing the transmission



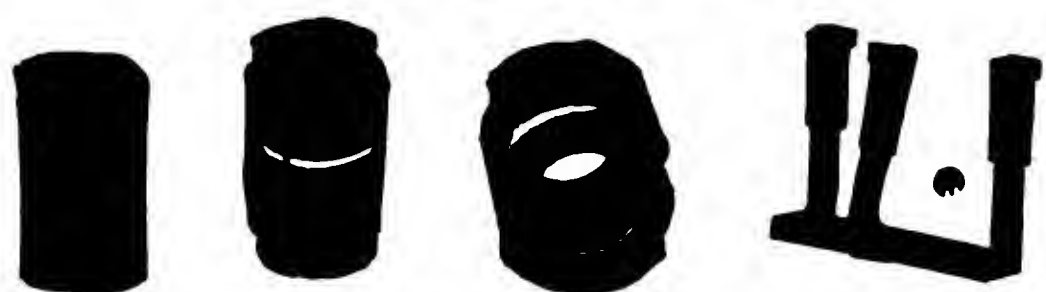
bands. The clamp shown in the cut holds the bands in perfect alignment and may be applied instantly. The wrench is drop forged, milled to exact size of the adjustment nuts, while the chain eliminates the chance of losing the wrench.

GIMLET BIT SETS.

The Goodell-Pratt Co., Greenfield,



Mass., manufacture a gimlet set consisting of 12 bits, 1/32 to 12/32 inches, put up in a round wooden box. Each bit is hand forged from crucible steel, carefully hardened, oil tempered and sharpened by hand.



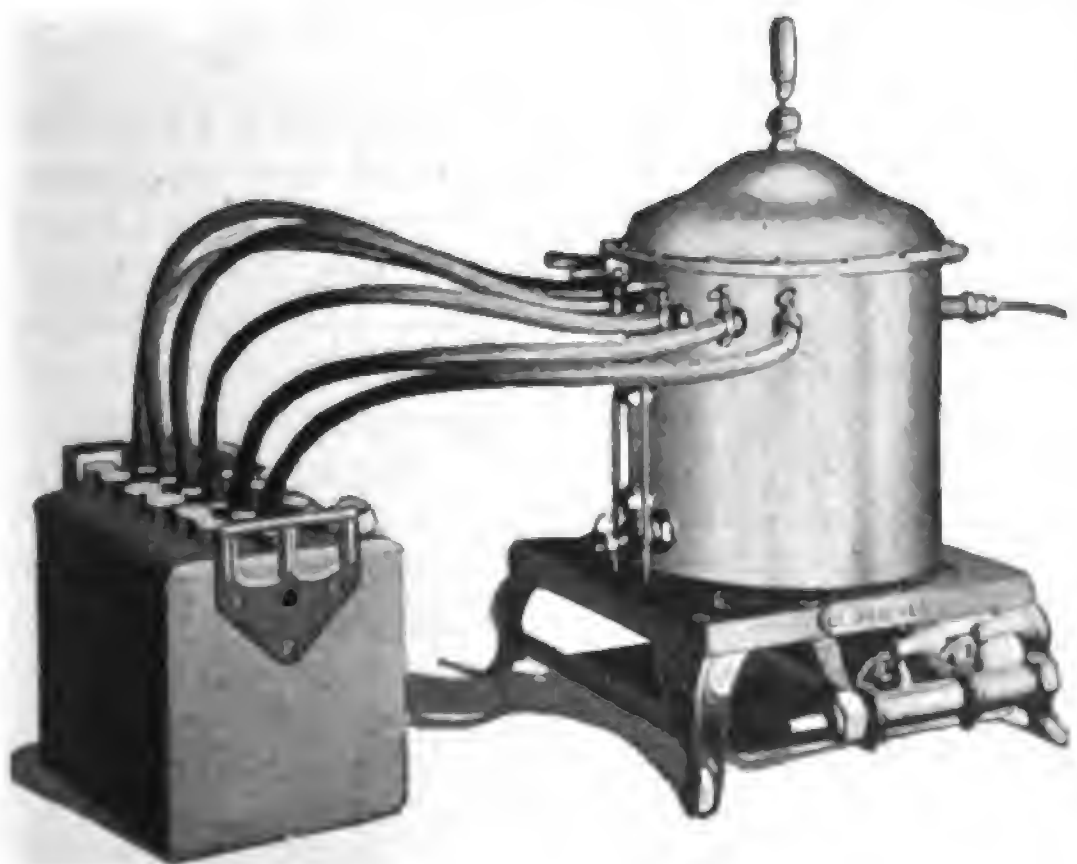
EAGLE UNIVERSAL ALIGNING FIXTURE.

The Eagle Machine Co., 24 North Noble street, Indianapolis, Ind., manufactures a Universal aligning fixture for trueing up connecting rods and pistons. This tool is capable of showing the service station repairer in a few minutes whether the connecting rod is twisted or whether the wrist pin opening is out of line with the connecting rod bearing. Such a tool is indispensable in the repair shop where engine overhauling is done, and should be in the kit of every repairer.

IBISCO BATTERY STEAMER.

The Bailey-Drake, Inc., 1120 South Michigan avenue, Chicago, Ill., manufactures an apparatus for the battery service station called the Ibisco Automatic Battery Steamer, which is ideal for steaming storage batteries preparatory to removing the cells from the battery box.

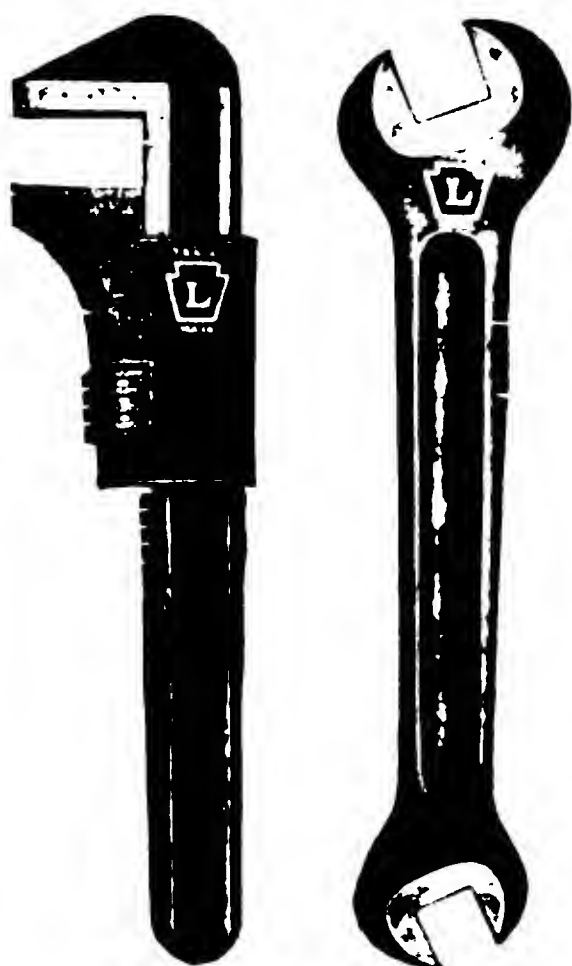
The steamer is made of 14-gauge spun aluminum, has no seams and no other



metal, other than brass or aluminum, comes in contact with the water. All models are equipped with safety valves, which keep the steam at low pressure suitable for the work.

LAKESIDE DROP FORGED WRENCHES.

The Lakeside Forge Co., Erie, Pa.,



manufacture a line of wrenches for service station use that are entirely new in design and every detail of their construction has been carefully worked out. For strength, workmanship, quality of material, appearance and general utility, they are said to be unsurpassed. All finished wrenches are milled to size and case hardened all over, polished and highly finished with bright heads lacquered. Unless otherwise ordered all wrenches are milled for U. S. standard nuts. A special line of heavy wrenches for United States standard nuts are also made and these will be found very useful for heavy work.

BARCALO MODEL N WRENCH.

The Barcalo Manufacturing Co., Buffalo, N. Y., shows its model N wrench for general purpose use, which is claimed to have been developed after much experimenting with wrenches of various kinds.



to develop a special type of wrench that would combine ease of operation and toughness.

The wrench is of the adjustable type and is operated by a knurled nut, which opens and closes a slidable jaw, the other jaw being stationary and forming a continuation of the handle. It is constructed on a 22½-degree angle and will fit standard hex nuts within its size.

RELIABLE BATTERY FILLER.

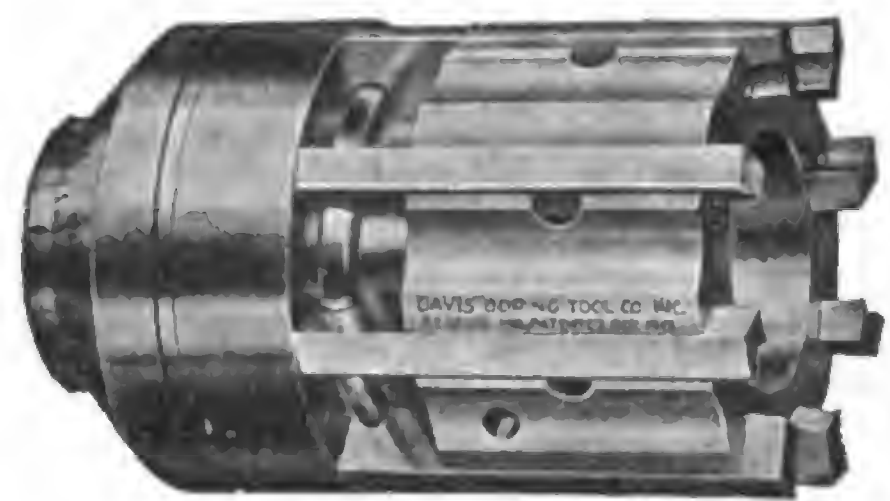
The Reliable Manufacturing Co., Cleveland, O., shows its new battery filler, which is designed especially for battery and serv-



ice station work. The device is fitted with a rubber tube equipped with a hard rubber end for filling batteries, a catch on the side member of the frame holding the tube when not in use. A bracket is also provided for the hydrometer used in testing the solution, while a handle is fitted at the top for carrying purposes.

DAVIS EXPANSION REAMER.

The Davis Boring Tool Co., 3718-24 Forest Park boulevard, St. Louis, Mo., manufacture a line of expansion reamers for the trade. This reamer is stated to represent the first application of the principle of forward movement of blades for the purpose of expansion. This fea-



ture always keeps the blades cutting in advance of the tool body; consequently, it is claimed, they never lose their bottoming feature. The movement of the blades is positively controlled by the adjusting dial, which expands or recedes them. They have liberal expansion, with one-quarter thousandth adjustment, and the locking of the blades is absolute and positive.

UNIVERSAL GASKETS.

The Universal Gasket & Manufacturing Co., 2901 South 48th Ave., Chicago, Ill., were designed to meet the demand of manufacturers for a first class gasket. They are of copper with an inner section of asbestos and are guaranteed to prevent the leakage of either gas or water. Universal gaskets are stated to be made of high grade material throughout and to stand up under the hardest usage.

HAULING PRODUCE IN HEATED TRUCKS

THE successful trucking of fruit in winter calls for careful handling and packing to guard against freezing, and the most up-to-date method yet noted for solving this problem is that adopted by the M. & M. Transportation Co., Inc., 73 Commercial street, Boston, Mass., which brings daily loads of fancy produce and fruit to Providence markets from Boston wholesalers, in heated trucks.

This company operates a fleet of eight five-ton Packard trucks, two of which are of the new type, and plans now being formulated call for additional heated units from time to time as circumstances permit. The idea is proving highly successful and is already far past the experimental stage.

The bodies of the trucks are 12 feet in length, seven feet wide and six feet in height. They were manufactured by the John L. Judd Co., 685 Beacon street, Boston, distributors of Commerce trucks, and follow the design of E. M. Rogers, shop superintendent for the company.

The double floors and sides are made from tongue and groove three-quarter inch oak, and the four-inch space between the outer and inner walls is insulated with cork. The back end opens out with two doors of the ice chest type, which are closed with a jam handle. These bodies are practically air tight and will retain heat a surprising length of time.

Heat is furnished by directing the exhaust into the body through the floor, and a temperature of 60 degrees can be maintained while running.

To Use Perfection Heater.

It is expected that the new bodies will be equipped with the Perfection heater, which is said to be giving very satisfactory service in somewhat similar installations.

The driver's seat is designed to hold five men, and the upper part directly over the driver's head is fitted with a berth, so that one man can sleep while the other is driving. As these trucks

frequently make three trips during 24 hours, it is necessary to carry two chauffeurs and the men speak highly of the novel sleeping quarters.

Presents Pleasing Appearance.

The body of the machine is finished in red and gold, the general color scheme followed in all open trucks owned by the company, and presents a very pleasing appearance.

Following its policy of always trying to give better service, the company has given orders for two refrigerator truck bodies, and two refrigerator trailers for delivery in the spring. The truck bodies will be made by the Judd company. They will be constructed along lines similar to the heated bodies and, so far as now planned, will use ice for cooling, although an ammonia system may possibly be installed.

Has Faith in Trailers.

The management has great faith in the trailer as a future asset to the business, and following its general policy of "getting in while the getting is good" plans to be among the first in this field to use them in Boston.

The company started operating in 1918 with one two-ton Autocar which they ran in relays to Providence, each of the three members of the concern taking the machine in turn. Today, in addition to the trucks owned by the firm, they are frequently forced to hire others to care for the growing business, and occasionally have as many as 10 in the fleet.

No Need to Advertise.

They have never had to advertise for any business and attribute their success to the fact that each of them has worked with their men. Everybody in the market district knows them well, and the general feeling of the wholesalers is summed up in the remark of one who said: "They'll get the stuff delivered in time if they have to carry it on their backs."

All rates are figured on a flat rate of 80 cents a mile and the contracts held

show that this figure represents a minimum charge. Many price cutting truckmen have tried to take away trade from them and have failed. Fruit and produce requires careful transporting and dealers are willing to pay well for satisfactory service.

All loads are covered by a blanket insurance policy of \$10,000, and in addition to this certain shipments are insured with policies covering the individual load.

All chauffeurs are paid a weekly wage of \$50, with the understanding that they work whatever hours business demands, and helpers get \$40, with the same conditions.

Trucks Always in Good Shape.

The trucks are kept running by James Fountain, a mechanic employed for eight years in Packard service. His job is to keep the machines going regardless of the time he has to spend on them, and he is paid a flat salary of \$60 a week. The fact that the machines are very seldom laid up speaks well of his ability.

"Just Starting," Says President.

It is safe to say that few trucking concerns have grown as rapidly in a substantial way as has the M. & M. Transportation Co. This healthy growth can be wholly traced to the efforts of the officers, who are: President, M. Markovitch; treasurer, Harry Marks, and clerk, M. Alkin. They have always worked in the market district since leaving school, so that it was comparatively easy for them to get started in the trucking end of the business. They have arrived at their present stage of development only by adhering strictly to the ideals they set out to accomplish, and according to the president of the concern, are "just starting."

STANDARDIZED TRAILER HITCHES ON SOME 1921 TRUCKS.

The Trailer Manufacturers' Association of America, with headquarters at Grand Central Palace, New York city, reports that a number of manufacturers are embodying changes in their 1921 truck models that will adapt these vehicles for drawing trailers. These include additional speed changes, four, five or six, with heavier rear end construction, coupling devices for trailers and increased braking surfaces.

The Society of Automotive Engineers some time ago approved the recommendations of a joint committee of its truck standards division and the Trailer Manufacturers' Association for standardized trailer hitches.

When truck manufacturers adopt standardized trailer hitches as regular equipment so that any make of trailer can be used with any make of truck it will be a common thing for trailers to be transferred from one motor express line to another just as freight cars are switched from one railroad to another for long hauls.



Heated Packard Truck Used for Hauling Produce by M. & M. Transportation Co., Boston, Mass.

Directory of Truck Industry

The Trade Names of the Vehicles, Names and Addresses of the Manufacturers, Personnel of the Various Organizations, and List of Models, with Their Capacities and Prices

The Basis of the Directory is the Trade Names, Which Are Alphabetically Arranged, So That Reference to Any One Can Be Made Almost Instantly.

A. & B.—American and British Mfg. Co., Providence, R. I.			
Model	Capacity Pounds	Chassis Price	Complete Price
3T	6,000	On Application	.....
5T	10,000	On Application	.....

ACASON—Acason Motor Truck Co., Detroit, Mich.			
Model	Capacity Pounds	Chassis Price	Complete Price
BR	2,000	\$2,400	.....
RB	3,000	2,650	.....
H	4,000	3,500	.....
L	7,000	4,500	.....
M	10,000	5,450	.....
President, H. W. Acason.		Ad. Man., J. G. Cashin.	
Vice Pres., Dan Gilkey.		Pur. Agent, J. R. Carr.	
Secretary, George Kraft.		Prod. Man., W. Acton.	
Sales Man., Dan Gilkey.		Export Man., Jose Merla.	

ACE—American Motor Truck Co., Newark, O.			
Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	\$2,750	.....
.....	5,000	3,450	.....
.....	6,000	3,650	.....

ACOME—Acme Motor Truck Co., Cadillac, Mich.			
Model	Capacity Pounds	Chassis Price	Complete Price
B	2,000	\$2,175	.....
F	3,000	2,475	.....
A	4,000	3,050	.....
C	7,000	4,050	.....
E	10,000	5,150	.....
President, W. F. Kysor.		Sales Man., C. J. Helm.	
Vice Pres., John Wilcox.		Ad. Man., A. W. Stroberg.	
Secretary, C. J. Helm.		Pur. Agent, C. Ramsey.	
Treasurer, C. H. Helm.		Prod. Man., J. H. Ballard.	

AIR-O-FLEX—Air-O-Flex Automobile Corp., Detroit, Mich.			
Model	Capacity Pounds	Chassis Price	Complete Price
A	3,500	.....	.....

ALL-AMERICAN—All-American Truck Co., Chicago, Ill.			
Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$1,395	.....

ALL-POWER—All-Power Truck Co., Detroit, Mich.			
Model	Capacity Pounds	Chassis Price	Complete Price
.....	7,000	\$4,500	.....

APEX—Hamilton Motors Co., Grand Haven, Mich.			
Model	Capacity Pounds	Chassis Price	Complete Price
D	3,000	\$1,915	.....

AETNA—Aetna Motor Corp., New York, N. Y.			
Model	Capacity Pounds	Chassis Price	Complete Price
.....	5,000	\$3,375	.....
.....	7,000	4,375	.....
.....	11,000	4,375	.....

AMERICAN—American Motor Truck & Tractor Co., New York.			
Model	Capacity Pounds	Chassis Price	Complete Price
.....	5,000	\$3,575	.....
.....	8,000	4,575	.....
President, Thomas Yenser.		Secretary, John V. Gormley.	
Vice Pres., E. W. Snyder.		Sales Man., H. L. Brown.	
Treasurer, E. W. Snyder.		Prod. Man., Fred N. Erickson.	

AMERICAN-LA FRANCE—American-La France Fire Engine Co., Inc., Elmira, N. Y.			
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ARMLEDER—O. Armleder Co., Cincinnati, O.			
Model	Capacity Pounds	Chassis Price	Complete Price
20	1,000	On Application	.....
HW	5,000	On Application	.....
KW	7,000	On Application	.....

ATCO—American Motor Truck & Trailer Corp., Kankakee, Ill.			
Model	Capacity Pounds	Chassis Price	Complete Price
B	3,000	\$2,450	.....
B-1	3,000	2,700	.....
A	5,000	3,150	.....

ATLANTIC—Atlantic Electric Vehicle Co., Newark, N. J.			
ATLAS—Atlas Truck Corp., York, Pa.			
Model	Capacity Pounds	Chassis Price	Complete Price
20	2,000	.....	.....

ATTERBURY—Atterbury Motor Car Co., Buffalo, N. Y.			
Model	Capacity Pounds	Chassis Price	Complete Price
20-R	3,000	\$2,775	.....
7-CX	5,000	3,575	.....
7-D	7,000	4,375	.....
8-E	10,000	5,975	.....
President, J. W. Van Allen.		Sales Man., W. A. Clare.	
Vice Pres., J. R. Spraler.		Ad. Man., W. A. Clare.	
Treasurer, J. C. Neal.		Pur. Agent, R. C. Huddle.	
Secretary, W. A. Clare.			

AUTOCAR—Autocar Co., Ardmore, Pa.			
Model	Capacity Pounds	Chassis Price	Complete Price
XXI-F	4,000	\$2,300	.....
XXI-G	4,000	2,400	.....
XXVI-Y	7,000	4,350	.....
XXVI-B	7,000	4,500	.....
President, David L. Ludlum.		Secretary, Walter Savoye.	
Vice Pres., E. A. Fitts.		Sales Man., H. M. Coale.	
Vice Pres., L. S. Clarke.		Ad. Man., W. E. Blodgett.	
Vice Pres., John S. Clarke.		Prod. Man., W. W. Norton.	
Vice Pres., W. W. Norton.		Pur. Agent, John H. Goulding.	
Treasurer, Walter Savoye.		Export Man., A. M. Bates.	

AUTOHORSE—One-Wheel Truck Co., St. Louis, Mo.			
Model	Capacity Pounds	Chassis Price	Complete Price
10	10,000	\$2,100	.....

AVAILABLE—Available Truck Co., Chicago, Ill.			
Model	Capacity Pounds	Chassis Price	Complete Price
H-1½	3,000	\$2,250	.....
H-2½	5,000	3,475	.....
H-3½	7,000	4,475	.....
H-5	10,000	5,575	.....
H-7	11,000	6,850	.....
President, John Rath.		Ad. Man., W. H. Blaha.	
Vice Pres., Edward Lansburg.		Pur. Agent, G. E. Schumaker.	
Treasurer, Edward Lansburg.		Chief Engineer, E. R. Burley.	
Sec., George E. Schumacher.		Prod. Man., E. R. Burley.	
Sales Man., W. H. Blaha.			

AVERY—Avery Co., Peoria, Ill.			
Model	Capacity Pounds	Chassis Price	Complete Price
.....	2,000	\$2,000	.....
President, J. B. Bartholomew.		Ad. Man., H. W. Barbour.	
Vice Pres., E. J. Boynton.		Prod. Man., E. M. Cressler.	
Treasurer, E. A. Cole.		Chief Engineer, W. J. Brendon.	
Secretary, C. L. Avery.		Export Manager, E. Voorhis	
Sales Man., C. E. Bronner.			

BECK—Hawkeye Motor Truck Works, Cedar Rapids, Ia.			
Model	Capacity Pounds	Chassis Price	Complete Price
AJ	3,000	\$1,500	.....
B	4,000	1,900	.....
C	5,000	2,250	.....
D	7,000	.....	.....
President, C. W. Meek.		Secretary, D. A. Stoffet.	
Treasurer, G. C. Schmelder.		Pur. Agent, C. W. Meek.	

BEACH CREEK—Beach Creek Truck & Auto Co., Beach Creek, Pa.			
Model	Capacity Pounds	Chassis Price	Complete Price
3-A	6,000	\$3,850	.....

BELL—Iowa Motor Truck Co., Ottumwa, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
E	3,000	\$2,250	.....

President, H. L. Bell. Vice Pres., O. L. Canning.
 Treasurer, J. D. Browning. Secretary, P. S. Baughn.
 Sales Man., K. J. Miller. Pur. Agent, J. D. Browning.
 Ad. Man., J. J. Miller. Prod. Man., H. L. Bell.
 Export Man., J. J. Miller.

BELMONT—Belmont Motor Truck Corp., Harrisburg, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
AA	1,500	\$1,150	.....
BB	3,000	1,950	.....

BESSEMER—Bessemer Motor Truck Co., Grove City, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
G	2,000	\$1,825	.....
H-2	3,000	2,285	.....
J-2	5,000	3,085	.....
K-2	8,000	4,285	.....

President, J. M. Lewis. Secretary, L. M. Monroe.
 Vice Pres., W. H. Shillito. Sales Man., J. M. Lewis.
 Treasurer, J. M. Lewis. Pur. Agent., W. H. Shillito.

BETHLEHEM—Bethlehem Motors Corp., Allentown, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
R	2,000	\$1,695	.....
G	4,000	2,595	.....
H	6,000	3,095	.....
J	8,000	3,995	.....

Vice Pres., M. H. Beary. Pur. Agent., R. H. Moses.
 Sales Man., Charles Mechado. Prod. Man., William Milne.
 Ad. Man., J. B. Alleman. Export Man., Charles Mechado.

BETZ—Betz Motor Truck Co., Hammond, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	5,000	\$2,985	.....

President, Irving Betz. Ad. Man., Lyman Betz.
 Vice Pres., Frank Betz. Pur. Agent., Irving Betz.
 Treasurer, Benjamin Helwig. Prod. Man., Joseph Sherwinski.
 Secretary, Lyman Betz. Export Man., Frank Betz.
 Sales Man., Byron Helwig. Chief Engineer, Irving K. Betz.

BIRCH—Birch Motor Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
1	2,000	\$1,595	.....

BRIDGEPORT—Bridgeport Motor Truck Co., Bridgeport, Conn.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,350	.....
B	5,000	2,850	.....
C	8,000	3,850	.....
D	12,000	4,500	.....

President, R. D. Campbell. Prod. Man., H. Meunier.
 Vice Pres., G. Cramer. Sales Man., R. D. Campbell.
 Vice Pres., C. Latons. Chief Engineer, H. Meunier.
 Secretary, C. W. Latons. Export Man., Leohart Motors
 Treasurer, C. W. Latons. Co., New York, N. Y.
 Pur. Agent, H. Meunier.

BRINTON—Brinton Motor Truck Co., Philadelphia, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
F	5,000	\$3,400	.....

President, J. Edward Brinton. Secretary, M. Robert Brinton.

BRISCOE—Briscoe Motor Corp., Jackson, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
T-34	2,000	\$1,550	.....

President, H. F. Wardwell. Ad. Man., W. S. Sherwood.
 Vice Pres., J. H. Findlater. Pur. Agent, F. S. Wedow.
 Treasurer, John Fletcher. Prod. Man., J. G. Cunningham.
 Secretary, L. K. Iatta. Export Man., C. L. Thurston.
 Sales Man., J. H. Findlater.

BROCKWAY—Brockway Motor Truck Co., Cortland, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
S-2	3,000	\$2,250	.....
K-4	5,000	3,200	.....
R-2	7,000	4,100	.....
T	10,000	5,250	.....

President, G. A. Brockway. Ad. Man., W. D. Morse.
 Vice Pres., R. B. Kelly. Prod. Man., H. M. Davis.
 Treasurer, F. R. Thompson. Pur. Agent, W. S. Eddy.
 Secretary, F. R. Thompson. Export Man., J. Gossmer.
 Sales Man., W. D. Morse.

CAPITOL—Capitol Motors Corp., Fall River, Mass.

Model	Capacity Pounds	Chassis Price	Complete Price
G-1½	3,000	\$2,750	.....
A-2½	5,000	3,450	.....

Model	Capacity Pounds	Chassis Price	Complete Price
K-2½	5,000	3,850	.....
M-3½	7,000	4,150	.....

CHEVROLET—Chevrolet Motor Co., Flint, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
G	1,500	\$920	.....
T	2,000	1,325	.....

CHICAGO—Chicago Motor Truck, Inc., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
C-1½	3,000	\$2,450	.....
C-2½	5,000	2,800	.....

CLIMBER—Climber Motor Truck Corp., Little Rock, Ark.

Model	Capacity Pounds	Chassis Price	Complete Price
A-20	3,000	\$2,450	.....

CLYDESDALE—Clydesdale Motor Truck Co., Clyde, O.

Model	Capacity Pounds	Chassis Price	Complete Price
32-X	2,000	\$2,375	.....
42	3,000	2,750	.....
65-X	5,000	3,540	.....
90	7,000	4,400	.....
120-B	12,000	5,500	.....

CONCORD—Abbott-Downing Truck & Body Co., Concord, N. H.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,950	.....
AX	3,000	3,050	.....
B	5,000	3,600	.....
BX	5,000	3,600	.....

COOK—Cook Motors Corp., Kankakee, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
41	4,000	\$3,000	.....

COLLIER—Collier Motor Truck Co., Bellevue, O.

Model	Capacity Pounds	Chassis Price	Complete Price
18	2,000	.....	.....
19	3,000	.....	.....
20	4,000	.....	.....
22	5,000	.....	.....

President, R. A. Palmer. Sales Man., J. F. Carl.
 Vice Pres., S. H. Canfield. Ad. Man., J. F. Carl.
 Treasurer, R. A. Palmer. Pur. Agent, F. W. Bock.
 Secretary, H. J. Crean. Prod. Man., W. C. Tucker.

COLUMBIA—Columbia Motor Truck & Trailer Co., Pontiac Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
F	2,000	.....	.....
G	5,000	.....	.....

COMET—Comet Automobile Co., Decatur, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
1½	3,000	\$1,950	.....

COMMERCE—Commerce Motor Car Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
T	1,500	\$1,350	.....
E	3,000	1,855	.....
EP	4,000	2,255	.....

President, W. E. Parker. Sales Man., George D. Wilcox.
 Vice Pres., H. B. Bennett. Ad. Man., H. C. Bardfield.
 Treasurer, F. A. Bradley. Pur. Agent, C. A. Clinger.
 Secretary, F. A. Bradley. Prod. Man., Charles L. Granger.

CONESTOGA—Conestoga Motor Truck Co., Lancaster, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
20	2,000	.....	.....
30	4,000	\$2,900	.....

CORBITT—Corbitt Motor Truck Co., Henderson, N. C.

Model	Capacity Pounds	Chassis Price	Complete Price
E	2,000	\$2,400	.....
D	3,000	2,800	.....
C	4,000	3,500	.....
B	5,000	3,650	.....
A	7,000	4,500	.....
AA	10,000	5,500	.....

President, R. J. Corbitt. Ad. Manager, E. F. Drew.
 Secretary, A. A. Zolliwoffer. Sales Man., E. F. Drew.
 Treasurer, W. S. Corbitt. Pur. Agent, D. A. Reese.
 Prod. Man., W. S. Corbitt.

CORLISS—Corliss Motor Truck Co., Corliss, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
A	1,000	.....	.....

COUPLE-GEAR—Couple-Gear Freight Wheel Co., Grand Rapids, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
HC	7,000	\$6,100	.....
AC	10,000	6,700	.....
LD	14,000	7,450	.....

President, W. C. Hobson. Ad. Man., L. V. Hudson.
 Vice Pres., C. P. Hummer. Pur. Agent, J. F. Vos.
 Vice Pres., A. J. Brown. Prod. Man., L. V. Hudson.
 Treasurer, M. H. Hopkins. Chief Engineer, K. Knudson.
 Secretary, M. H. Hopkins. Export Man., L. V. Hudson.
 Sales Manager, L. V. Hudson.

DART—Dart Truck and Tractor Corp., Waterloo, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
S	3,000	\$2,250	.....
M	5,000	3,000	.....
I	7,000	4,000	.....

DAY-ELDER—Day-Elder Motors Corp., Newark, N. J.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$2,100	.....
B	3,000	2,300	.....
D	4,000	2,750	.....
C	5,000	2,950	.....
F	7,000	3,750	.....
E	10,000	4,600	.....

President, Charles Day. Ad. Man., J. H. Kelly.
 Vice Pres., F. G. Elder. Pur. Agent, W. W. Black.
 Vice Pres., G. A. Gemmer. Chief Engineer, G. A. Gemmer.
 Treasurer, F. G. Elder. Prod. Man., G. A. Gemmer.
 Secretary, F. G. Elder. Export Man., W. R. Cook.
 Sales Man., F. G. Elder.

DEARBORN—Dearborn Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
F	3,000	\$2,180	.....
48	4,000	2,590	.....

President, S. D. Porter. Ad. Man., H. E. Davis.
 Vice Pres., G. T. Basel. Pur. Agent, C. W. Teach.
 Treasurer, R. A. Noll. Prod. Man., W. R. Lavine.
 Secretary, G. T. Bailey. Export Man., C. E. Balter.
 Sales Man., G. T. Basel.

DEFIANCE—Defiance Motor Truck Co., Defiance, O.

Model	Capacity Pounds	Chassis Price	Complete Price
D	3,000	\$2,550	.....
E	4,000	2,750	.....

President, C. H. Kettering. Secretary, H. H. Morse.
 Vice Pres., J. C. Ayers. Sales Man., E. W. Warrington.
 Treasurer, J. F. Robertson.

DEKALB—DeKalb Wagon Co., DeKalb, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
E-2	4,000	\$2,100	.....
E-2½	5,000	2,600	.....

DE MARTINI—De Martini Motor Car Co., San Francisco, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
1	2,000	\$2,255	.....
2	4,000	2,750	.....
3	6,000	3,650	.....
4	8,000	4,250	.....

DENBY—Denby Motor Truck Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
12	2,000	\$2,400	.....
134	4,000	2,800	.....
25	6,000	3,600	.....
27	8,000	4,600	.....
210	1,000	5,350	.....

President, A. S. More. Ad. Man., E. T. Sutton.
 Sales Man., L. B. Graham. Export Man., G. W. Werden.

DEPENDABLE—Dependable Truck & Tractor Co., Galesburg, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,500	\$1,750	.....
C	3,000	2,350	.....
D	4,000	2,650	.....
E	5,000	2,750	.....

President, C. V. Morse. Treas., W. B. Meeks.
 Secretary, W. B. Meeks. Sales Man., A. E. Patchin.
 Vice Pres., A. E. Patchin. Pur. Agent, E. P. Knox.
 Prod. Man., A. R. Knox.

DIAMOND T—Diamond T Motor Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
FS	3,000	\$3,100	.....
T	3,000	2,450	.....
U	4,000	2,835	.....
K	7,000	3,925	.....
EL	10,000	4,615	.....

Model	Capacity Pounds	Chassis Price	Complete Price
S	10,000	4,800	.....

President, C. A. Tilt. Treas. & Sec., S. A. Cook
 Sales Man., E. J. Bush. Export Man., R. D. Spradling.
 Vice Pres., Ira Darling. Pur. Agent, H. C. Emberson.
 Prod. Man., C. A. Pierce.

DIEHL—Diehl Motor Truck Works, Philadelphia, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$1,750	.....

DISPATCH—Dispatch Motor Car Co., Minneapolis, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
G	1,290	\$1,200	.....

DOANE—Doane Motor Truck Co., San Francisco, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
2½	5,000	\$4,100	.....
3½	7,000	5,100	.....
6	12,000	6,000	.....

DODGE—Dodge Brothers, Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,000	\$955	.....

President, H. E. Dodge. Ad. Man., G. H. Phelps.
 Treasurer, H. E. Dodge. Export Man., H. M. Robins.
 Vice Pres. & Gen. Man., F. J. Asst. Gen. Man., A. T. Waterfall.
 Haynes. Pur. Agent, R. H. Allen.
 Asst. Sec., H. V. Poppeny. Prod. Man., A. Z. Mitchell.
 Act. Sales Man., C. W. Matheson. Chief Engineer, Russell Huff.

DORRIS—Dorris Motor Car Corp., St. Louis, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
K-4	4,000	\$3,400	.....
K-7	7,000	4,400	.....

President, George Dorris. Sales Man., J. T. Rumble.
 Vice Pres., I. C. Muckermamm. Pur. Agent, J. D. McCarthy.
 Treasurer, J. F. Culver. Prod. Man., A. B. Horton.
 Secretary, J. F. Culver. Chief Engineer, George Dorris.
 Gen. Man., I. C. Muckermamm.

DOUBLE DRIVE—Double Drive Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	\$2,000	.....
.....	6,000	3,000	.....

President, Robert Keck. Secretary, Robert Erskin.
 Vice Pres., Charles Schinhorth. Sales Man., Arthur Stenzel.
 Treasurer, Leslie Senrlick. Chief Engineer, H. F. Hoffman

DOUGLAS—Douglas Motors Corp., Omaha, Neb.

Model	Capacity Pounds	Chassis Price	Complete Price
C-1	2,000	\$1,600	.....
D-1½	3,000	2,000	.....
E-2½	5,000	2,525	.....
2½	5,000	2,725	.....

DUPLEX—Duplex Truck Co., Lansing, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
E	7,000	\$4,250	.....
Limited	3,000	2,775	.....

President, H. M. Lee. Sales Man., A. Langbucker.
 Vice Pres., H. F. Harper. Pur. Agent, A. C. Pratt.
 Treasurer, G. W. Hewitt. Prod. Man., W. W. Mitchell.
 Secretary, G. W. Hewitt. Chief Engineer, G. F. Thomas.

DURYEA—Duryea Motors, Inc., Philadelphia, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,000	\$600	.....

DUTY—Duty Motor Co., Greenville, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
21	4,000	\$1,590	.....

President, W. H. Ruther. Ad. Man., P. Harnethaux.
 Vice Pres., W. J. Dubser. Pur. Agent, W. J. Dubser.
 Treasurer, J. P. Snowden. Export Man., G. W. Flynn.
 Secretary, J. P. Snowden. Prod. Agent, W. H. Ruther.
 Sales Man., P. Harnethaux. Chief Engineer, W. H. Ruther.

EAGLE—Eagle Motor Truck Corp., St. Louis, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
100	4,000	\$1,995	.....

President, T. R. Ayres. Ad. Man., R. H. Ferguson.
 Vice Pres., J. P. Reis. Pur. Agent, J. P. Reis.
 Treasurer, J. W. Hay. Export Man., R. H. Ferguson.
 Secretary, R. E. Fitch. Prod. Man., J. P. Reis.
 Sales Man., R. H. Ferguson. Chief Engineer, J. P. Reis.

ELMIRA—Elmira Commercial Motor Car Co., Elmira, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
C	1,000	\$500	.....

ELLSWORTH—Mills-Ellsworth Co., Keokuk, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
25-A	1,000	\$555	.....

ERIE—Erie Motor Truck Mfg. Co., Erie, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	On Application	.....
.....	5,000	On Application	.....
.....	7,000	On Application	.....

President, L. H. Helman. Ad. Man., G. W. Foster.
 Vice Pres., J. J. Harvey. Pur. Agent, S. A. Wiltsie.
 Treasurer, J. H. Rastatter. Service Man., D. B. Barnes.
 Secretary, H. C. Liedau. Chief Engineer, S. A. Wiltsie.
 Sales Man., L. H. Walker.

FAGEOL, Fageol Motors Co., Oakland, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
1½	3,000	\$3,000	.....
2½	5,000	3,900	.....
.....	8,000	5,000	.....
4,500	7,000	5,000	.....
5,300	10,000	5,700	.....
.....	12,000	5,700	.....

FAMOUS—Famous Trucks, Inc., St. Joseph, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
B-10	2,000	\$1,995	.....
.....	3,000	1,690	.....
B-12	3,000	2,295	.....

FARGO—Fargo Motor Car Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
T	4,000	\$2,800	.....

FEDERAL—Federal Motor Truck Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
S-D	2,000	\$2,500	.....
T-E	3,000	2,725	.....
U-E	4,000	3,025	.....
W-D	7,000	3,950	.....
X C	10,000	4,600	.....
Tractor	6,000	3,200	.....
Tractor	14,000	4,150	.....

President, T. Reeder. Sales Man., F. L. Pierce.
 Vice Pres., M. L. Pulcher. Ad. Man., L. B. Dudley.
 Vice Pres., W. C. Rowley. Export Man., W. Ward Mohun.
 Vice Pres., H. Warner. Pur. Agent, H. Copeland.
 Treasurer, E. P. Hammond. Prod. Man., H. Warner.
 Secretary, G. F. Mallot. Chief Engineer, C. I. Wood.
 Gen. Man., M. L. Pulcher.

FORD—Ford Motor Co., Highland Park, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
T T	2,000	\$545	.....

President, Edsel Ford. Ad. Man., C. A. Brownell.
 Vice Pres., F. L. Klingensmith. Pur. Agent., F. H. Diehl.
 Treasurer, F. L. Klingensmith. Prod. Man., W. Knudsen.
 Secretary, B. G. Craig. Foreign Dept., 1710 B'way, N. Y.
 Sales Man., W. A. Ryan.

FORSCHLER—Forschler Motor Truck Mfg. Co., New Orleans, La.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$2,100	.....
A X	3,000	2,375	.....
B	4,000	2,750	.....
B X	6,000	3,450	.....
A T	6,000	.....	.....
A X T	8,000	.....	.....
B T	10,000	.....	.....
B X T	12,000	.....	.....

FULTON—Fulton Motors Corp., Farmingdale, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
C	4,000	\$2,350	.....
D-Tractor	.....	2,550	.....
A	1,500	1,775	.....

President, Garvin Denby. Gen. Supt., J. A. Bell.
 Vice Pres., E. L. Parosol. Ad. Man., W. E. Carpenter.
 Secretary, C. R. Knoll. Pur. Agent, J. A. Bell.
 Treasurer, H. T. Carpenter. Prod. Man., J. A. Bell.
 G. Sales Man., W. E. Carpenter. Export Man., W. E. Carpenter.

F. W. D., Four Wheel Drive Co., Clintonville, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
B	6,000	\$4,900	.....

President, W. A. Glen. Ad. Man., E. M. McLeon.
 Vice Pres., C. F. Folkman. Export Man., C. S. Thompson.
 Treasurer, D. J. Rohrer. Pur. Agent, G. Billings.
 Secretary, Frank Gauze. Prod. Man., G. C. MacConnell.
 Sales Man., J. P. Hewitt. Chief Engineer, H. B. Dodge.

GARFORD—Garford Motor Truck Co., Lima, O.

Model	Capacity Pounds	Chassis Price	Complete Price
25-B	2,500	\$2,290	.....
70-H	4,000	3,450	.....
77-D	7,000	4,390	.....
77-C	7,000	4,500	.....
68-D	10,000	5,300	.....
70-H Tractor	9,000	3,550	.....
77 Tractor	14,000	4,600	.....
68 Tractor	20,000	5,300	.....

GARY—Gary Motor Truck Co., Gary, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
F T	2,000	\$2,100	.....
G T	3,000	2,550	.....
J	5,000	3,150	.....
K T	7,000	4,050	.....
M	10,000	5,150	.....

President, Frank Dawson. Secretary, Robert Scott.
 Vice Pres., Theodore Zumstein. Ad. Man., Robert Crothers.
 Treasurer, Robert Scott. Pur. Agent, W. Ruth.

G. A. SCHACHT—Schacht Motor Truck Co., Cincinnati, O.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	\$3,550	.....
.....	5,000	3,850	.....
.....	7,000	4,350	.....
.....	10,000	5,350	.....

C. Engineer, E. Von Rakowski. Sales Man., Albert Staab.
 President, J. A. Schacht. Ad. Man., Albert Staab.
 Vice Pres., C. R. Talbot. Pur. Agent, H. W. Trieberg.
 Treasurer, William Schacht. Prod. Man., C. C. Evans.
 Secretary, William Schacht. Export Man., B. D. Arthur.

GERSIX—Gersix Mfg. Co., Seattle, Wash.

Model	Capacity Pounds	Chassis Price	Complete Price
M	3,000	\$3,100	.....
K	5,000	3,500	.....
L	7,000	4,500	.....

GIANT—Giant Truck Corp., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
15-A	3,000	\$2,250	.....
16	4,000	3,250	.....
17	7,000	4,450	.....

President, A. Weber. Sales Man., J. E. Joyce.
 Vice Pres., C. A. Finnegan. Ad. Man., M. Weber.
 Treasurer, E. D. Hofeller. Export Man., J. E. Joyce.
 Secretary, E. D. Hofeller. Pur. Agent, M. Weber.
 General Man., J. E. Joyce. Chief Engineer, J. E. Joyce.

GMC—General Motor Truck Co., Pontiac, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
16	2,000	.....	.....
31	3,000	.....	.....
41	4,000	.....	.....
71	7,000	.....	.....
101-A	10,000	.....	.....
101-B	10,000	.....	.....

GRAHAM—Graham Bros., Evansville, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,495	.....

President, Z. F. Graham. Sales Man., R. C. Graham.
 Vice Pres., J. B. Graham. Ad. Man., F. G. Blair.
 Vice Pres., R. C. Graham. Pur. Agent, H. Kessinger.
 Treasurer, Roy Graham. Prod. Man., J. D. Graham.
 Secretary, Roy Graham.

GRAMM-BERNSTEIN—Gramm-Bernstein Motor Truck Co., Lima, O.

Model	Capacity Pounds	Chassis Price	Complete Price
Speed Truck	3,000	\$2,495	.....
10	2,000	1,495	.....
15	3,000	2,250	.....
65	3,000	2,275	.....
20	4,000	3,275	.....
25	5,000	3,875	.....
25	7,000	4,775	.....
50	10,000	5,875	.....

President, M. Bernstein. Pur. Agent, V. E. Helser.
 Vice Pres., B. A. Gramm. Export Man., A. E. Schafer.
 Treasurer, M. Bernstein. Prod. Man., R. I. Pierce.
 Gen. Man., B. A. Gramm. Chief Engineer, R. W. Austin.
 Sales Man., A. E. Schafer.

GRANT—Grant Motor Car Corp., Cleveland, O.

Model	Capacity Pounds	Chassis Price	Complete Price
17	3,000	\$2,675	.....

President, D. A. Shaw. Pur. Agent, G. C. Starkweather.
 Vice President, George Grant. Prod. Man., F. S. Denneen.
 Vice Pres., G. C. Hubbs. Chief Engineer, J. M. Howe.
 Treasurer, F. S. Denneen. Prod. Engineer, H. G. Stewart

Secretary, H. R. Green.
Sales Man., F. S. Stratton.
Ad. Man., C. C. Campbell.

Export Man., Industrial Export
Co., 245 W. 55th St., N. Y. C.

Treasurer, J. G. Zabel.
Secretary, J. G. Zabel.
Gen. Sales Man., J. A. Naddeau.
Prod. Man., L. J. Percy.

Director, E. M. Schrauder.
Director, J. A. Naddeau.
Director, J. G. Zabel.
Director, H. D. Hoffman.

G. W. W.—Wilson Truck Mfg. Co., Henderson, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
F S	3,000	\$2,100	.....

HAHN—Hahn Motor Truck Co., Hamburg, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
J-4	2,000	.....	.....
C D	2,000	.....	.....
D	4,000	.....	.....
D E	5,000	.....	.....
F	7,000	.....	.....
F E	10,000	.....	.....

President, William G. Hahn. Sales Man., W. Hahn.
Vice Pres., I. A. Diener. Ad. Man., W. Hahn.
Treasurer, H. J. Diener. Pur. Agent, A. G. Hahn.
Secretary, A. G. Hahn. Prod. Man., Chas. Kline.

HAL-FUR—Hal Fur Motor Truck Co., Cleveland, O.

Model	Capacity Pounds	Chassis Price	Complete Price
E	2,000	\$2,350	.....
B	5,000	3,250	.....

President, William Wischmeyer. Secretary, W. S. Kerr.
Vice Pres., Charles Hall. Pur. Agent, I. E. Smith.
Treasurer, Elmer Wischmeyer. Chief Engineer, William Smith.

H. & M.—H. & M. Motor Truck Co., Baltimore, Md.

Model	Capacity Pounds	Chassis Price	Complete Price
2	4,000	.....	.....

HALL—Lewis-Hall Iron Works, Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	.....	.....
.....	5,000	\$3,275	.....
.....	7,000	4,100	.....
.....	10,000	5,100	.....

HARVEY—Harvey Motor Truck Co., Harvey, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
W E A	3,000	\$2,350	.....
W F A	5,000	3,000	.....
W H A	7,000	4,300	.....
W K A	10,000	5,050	.....
H-T	20,000	5,000	.....

HAWKEYE—Hawkeye Truck Co., Sioux City, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
10	3,000	\$2,365	.....
M	4,000	2,915	.....
N	7,000	4,345	.....

President, R. A. Brunert. Chief Engineer, H. Keagle.
Asst. Sales Man., W. Lidster.

HENDRICKSON—Hendrickson Motor Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
I	5,000	\$3,150	.....
J	7,000	3,975	.....
K	10,000	5,400	.....

HEWITT-LUDLOW—Ralston Iron Works, San Francisco, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	.....	.....
.....	5,000	.....	.....
.....	7,000	.....	.....
.....	10,000	.....	.....
.....	12,000	.....	.....

HIGHWAY-KNIGHT—Highway Motors Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
A	8,000	.....	.....
B	10,000	.....	.....

HIGRADE—Higrade Motors Co., Harbor Spring, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
A-18	2,000	\$2,100	.....

President, I. E. Ewing. Sales Man., O. A. Kruse.
Vice Pres., G. W. Nelson. Ad. Man., O. A. Kruse.
Vice Pres., H. S. Armstrong. Pur. Agent, L. Shay.
Treasurer, L. Shay. Prod. Man., H. D. Armstrong.
Secretary, L. Shay. Chief Engineer, L. Shay.

HOOD—Hood Motor Co., Monroe, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	.....	.....

President, W. C. Hood. Chief Engineer, W. L. Schultz.
Vice Pres., E. M. Schrauder. Director, W. C. Hood.

H. R. L.—H. R. L. Motor Co., Seattle, Wash.

Model	Capacity Pounds	Chassis Price	Complete Price
R	3,000	\$3,250	.....
H	5,000	3,650	.....

HUFFMAN—Huffman Bros. Motor Co., Elkhart, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
C	3,000	\$1,695	.....
B	3,000	1,895	.....

HURLBURT—Hurlburt Motor Co., Inc., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	\$2,850	.....
.....	5,000	3,750	.....
.....	7,000	4,590	.....
.....	10,000	5,500	.....

INDEPENDENT—Independent Motor Co., Youngstown, O.

Model	Capacity Pounds	Chassis Price	Complete Price
F	3,000	\$2,585	.....
H	5,000	3,285	.....
K	7,000	4,285	.....

President, Edwin Haseltine. General Man., A. W. Frantz.
Vice Pres., A. W. Frantz. Chief Engineer, W. B. Engler.

INDEPENDENT—Independent Motor Truck Co., Davenport, Ia.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	2,000	\$1,510	.....
E	3,000	2,040	.....
F	4,000	2,490	.....

INDIANA—Indiana Truck Corp., Marion, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
12	2,100	\$2,290	.....
20	4,000	2,950	.....
25	5,000	3,150	.....
35	7,000	3,750	.....
51	10,000	4,775	.....

President, C. G. Barley. Sales Man., F. A. Kightlinger.
Vice Pres., J. W. Stephenson. Ad. Man., S. W. Winder.
Treasurer, J. W. Stephenson. Export Man., Pable Homs.
Secretary, S. W. Winder.

INTERNATIONAL—International Harvester Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
H	1,500	\$1,550	.....
F	2,000	2,050	.....
K	3,000	2,200	.....
G	4,000	2,800	.....
L	7,000	4,500	.....

President, Harold McCormick. Ad. Man., E. W. Heiskell.
Vice Pres., Alex. Legge. Sales Man., O. H. Browning.
Vice Pres., A. E. McKinstry. Export Man., C. H. Haney.
Vice Pres., H. F. Perkins. Pur. Agent, W. D. Edgar.
Treasurer, Geo. A. Ranney. Works Man., Cy. McCormick, Jr.
Secretary, Geo. A. Ranney. Chief Engineer, F. A. Johnston.
Gen. Man., Alex. Legge.

J. & J.—The Lorain Motor Truck Co., Lorain, O.

Model	Capacity Pounds	Chassis Price	Complete Price
D	4,000	\$3,250	.....

President, J. C. Hayes. Treasurer, John N. Webbbs.
Vice Pres., M. J. Henninger. Chief Engineer, E. C. Juergens.

JACKSON 4-WHEEL DRIVE—Jackson Motor Corp., Jackson, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
B	7,000	\$4,450	.....

JONES—Jones Motor Car Co., Wichita, Kan.

Model	Capacity Pounds	Chassis Price	Complete Price
31-A	2,000	\$1,495	.....

JUMBO—Nelson Motor Truck Co., Saginaw, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
15	3,000	\$2,425	.....
20	4,000	2,675	.....
25	5,000	3,090	.....
30	6,000	3,590	.....
35	7,000	4,080	.....
40	8,000	4,730	.....

President, H. B. Nelson. G. Sales Man., Cecil B. Warner.
Vice Pres., I. J. Nelson. As. S. Man., Allen W. Campbell.
Secretary, C. J. Nelson. Pur. Agent, E. B. Galbraith.
Treasurer, C. J. Nelson. Prod. Man., Fred Glover.

KALAMAZOO—Kalamazoo Motor Corp., Kalamazoo, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
G	3,000	\$3,100	.....
H	5,000	3,700	.....
K	7,000	4,300	.....

President, H. A. Crawford. Ad. Man., H. G. Stiles.
 Vice Pres., C. J. Johnson. Export Man., James Zobian.
 Treasurer, W. B. Milham. Pur. Man., R. M. Gregory.
 Secretary, R. M. Gregory. Prod. Man., L. W. Coppack.
 Sales Man., H. G. Stiles. Chief Eng'r, L. W. Coppack.

KANKAKEE—Kankakee Automobile Co., Kankakee, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
E P	5,000	\$3,175	.....

President, Joseph F. Malloney. Sales Man., J. G. Parker.
 Vice Pres., E. S. Bram. Pur. Agent, R. E. Parker.
 Treasurer, George Ehrlich. Prod. Man., R. E. Parker.
 Secretary, George H. Ehrlich.

KARAVAN—Caravan Motors Co., Portland, Ore.

Model	Capacity Pounds	Chassis Price	Complete Price
A	5,000	.....	.....

President, E. D. Van Dersal. Sales Man., E. D. Van Dersal.
 Vice Pres., Fred Hesse. Pur. Agent, George Peters.
 Treasurer, W. K. Kellogg. Chief Engineer, George Peters.
 Secretary, W. L. Boise.

KEARNS—Dughe Motors Corp., Danville, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
H	1,500	\$1,600	.....
N	3,000	2,200	.....

President, W. G. Pursel. Sales Man., M. V. Dughe.
 Vice Pres., C. M. Kearns. Export Man., C. M. Kearns.
 Treasurer, M. V. Dughe. Ad. Man., M. V. Dughe.
 Secretary, M. V. Dughe.

KELDEN—House Cold Tire Setter Co., St. Louis, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
19	4,000	\$2,885	.....

KELLY-SPRINGFIELD—Hares Motors, Inc., N. Y. City, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
K-31	3,000	\$2,900	.....
K-34	3,000	2,900	.....
K-35	5,000	3,250	.....
K-36	5,000	3,250	.....
K-40	7,000	4,200	.....
K-41	7,500	4,650	.....
K-42	7,000	4,200	.....
K-45	8,000	4,550	.....
K-50	10,000	4,900	.....
K-60	12,000	5,100	.....

President, Emlen Hare. Vice Pres., O. E. Hunt.
 Vice Pres., Henry Lansdale. Treasurer, F. R. Hickman.
 Vice Pres., H. C. Church. Secretary, F. R. Hickman.

KEYSTONE—Keystone Motor Truck Co., Oakes, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	2,000	.....	.....
40	4,000	\$2,550	.....

Treasurer, E. K. Monington. Pur. Agent, B. H. Oellert.
 Secretary, E. K. Monington. Prod. Man., O. C. Beacroft.
 Sales Man., M. S. Cooper. Chief Engineer, M. Olbeter.

KIMBALL—Kimball Motor Truck Co., Los Angeles, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$3,075	.....
B. & B. L	4,000	3,675	.....
C. & C. L	5,000	3,975	.....
E. & E. L	8,000	4,400	.....
F. & F. L	10,000	5,975	.....

KING ZEITLER—King Zeitler Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	.....	.....
.....	8,000	.....	.....

KISSEL—Kissel Motor Car Co., Hartford, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,500	\$1,875	.....
.....	3,000	2,275	.....
.....	4,000	2,975	.....
.....	7,000	3,975	.....
.....	10,000	4,785	.....

KLEIBER—Kleiber Co., Inc., San Francisco, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$2,400	.....
A	3,000	2,800	.....
B B	4,000	3,200	.....
C	7,000	4,400	.....

Model	Capacity Pounds	Chassis Price	Complete Price
D	10,000	5,300	.....

President, Paul Kleiber. Ad. Man., A. Hammersmith.
 Vice Pres., John Woerner. Export Man., A. Hammersmith.
 Treasurer, A. Hammersmith. Pur. Agent, Carl Uster.
 Secretary, Peter Seiden. Prod. Man., Carl Uster.
 Sales Man., W. H. Sampson. Chief Engineer, Carl Uster.

KOEHLER—H. J. Koehler Motors Corp., Bloomfield, N. J.

Model	Capacity Pounds	Chassis Price	Complete Price
C	2,500	\$1,985	.....
M	5,000	3,365	.....
M T-Tractor	10,000	3,450	.....

President, H. J. Koehler. Ad. Man., Charles S. Clark.
 Vice Pres., W. A. Koehler. Export Man., Charles S. Clark.
 Treasurer, M. M. Bennette. Pur. Agent, C. G. Brerwiler.
 Secretary, M. M. Bennette. Prod. Man., Carl D. Peterson.
 Sales Man., Charles S. Clark.

LANDSHAFT—William Landshaft & Son, Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
G I	2,000	\$1,350	.....
L I	4,000	1,950	.....

LANGE—Lange Motor Truck Co., Pittsburgh, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
B	5,000	\$3,000	.....

LARRABEE—Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
U	3,000	\$2,400	.....
K	5,000	3,400	.....
L	7,000	4,200	.....
W	10,000	5,100	.....

President, E. Hanrahan. Export Man., R. H. Deyo.
 Treasurer, F. F. Macey. Pur. Agent, Dewitt Parsons.
 Secretary, I. Deyo. Prod. Man., A. Deyo.
 Sales Man., N. Weeks Burys.

LION—Leindorf Motor Sales Corp., New York City, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,500	.....	.....

President, E. Leindorf. Service Man., Leonce Raboin.
 Sales Mg. A. H. Mollenhauer, Jr. Ad. Man., Putnum Drew.

L. M. C.—Louisiana Motor Car Co., Shreveport, La.

Model	Capacity Pounds	Chassis Price	Complete Price
2-20	5,000	\$2,540	.....

President, W. F. French. Treasurer, P. W. Southerland.
 Vice Pres., H. V. Hearne. Secretary, P. W. Southerland.

LOMBARD—Lombard Auto Tractor Corp., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	10,000	.....	.....

LONE STAR—Lone Star Truck & Trac. Assn., San Antonio, Tex.

Model	Capacity Pounds	Chassis Price	Complete Price
11	4,000	\$1,745	.....

President, H. C. Feldman. Export Man., H. C. Hellig.
 Treasurer, J. F. Curtis. Pur. Agent, J. W. Oswald.
 Secretary, Max W. Eisenbach. Prod. Man., A. D. Shaw.
 Sales Man., J. W. Oswald. Chief Engineer, J. W. Oswald.
 Ad. Man., J. W. Oswald.

LUVERNE—Luverne Automobile Co., Luverne, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
B B L	4,000	1,800	.....

LUEDINGHAUS—Luedinghaus-Eapenscheid Wagon Co., St. Louis, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
K	4,000	\$2,790	.....
K-L S	4,000	2,890	.....
W	3,000	2,490	.....

MACCAR—Maccar Truck Co., Scranton, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
L	3,000	\$2,925	.....
H	5,000	3,650	.....
M-2	7,000	4,500	.....
G	10,000	5,500	.....

MACDONALD—MacDonald Truck & Tractor Co., San Francisco, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
A	14,000	\$5,750	.....

Vice Pres., W. W. MacDonald. Secretary, G. Taubles.
 Treasurer, C. Cutter. Pur. Agent, R. E. Pettingell.

MACK—International Motor Co., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
A B	3,000	\$3,000	.....
A B	4,000	3,300	.....
A B	3,000	3,450	.....
A B	4,000	3,750	.....
A B-Tractor	10,000	3,400	.....
A C	7,000	4,950	.....
A C	10,000	5,500	.....
A C	13,000	5,750	.....
A C	15,000	6,000	.....
A C-Tractor	14,000	4,950	.....
A C-Tractor	20,000	5,500	.....
A C-Tractor	26,000	5,750	.....
A C-Tractor	30,000	6,000	.....

Treasurer, Frank Trude.
Secretary, Frank Trude.
Sales Man., C. D. Peet.

Prod. Man., S. H. Rae.
Export Man., American Motors.

NASH—Nash Motors Co., Kenosha, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
2018	2,000	\$1,650	.....
3018	4,000	2,175	.....
4017	4,000	3,250	.....

President, C. W. Nash.
Vice Pres., W. H. Alford.
Vice Pres., J. Wilson.
Vice Pres., C. B. Voorhis.
Treasurer, G. H. Eddy.
Secretary, H. J. Mellum.

Gen. Sales Man., C. B. Voorhis.
As. Sales Man., W. W. Smith.
Ad. Man., E. J. Travers.
Export Man., J. A. Rose.
Pur. Agent, Harold Song.
Prod. Man., Mr. Moohan.

MAIBOHM—Maibohm Motors Co., Sandusky, O.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,000	\$1,290	.....

President, H. C. Maibohm.
Vice Pres., T. W. Cushing.
Vice Pres., W. C. Maibohm.
Treasurer, I. O. Bormann.
Secretary, I. O. Bormann.
Sales Man., L. G. Parkhurst.

Ad. Man., T. W. Cushing.
Export Man., C. J. Jerosch.
Prod. Man., W. C. Maibohm.
Pur. Agent, W. J. Corr.
Chief Engineer, H. J. Holton.

NELSON—Nelson & Le Moon, Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
F-1	3,000	On Application	.....
F-2	4,000	On Application	.....
F-3½	6,000	On Application	.....
F-5	10,000	On Application	.....

NETCO—New England Truck Co., Fitchburg, Mass.

Model	Capacity Pounds	Chassis Price	Complete Price
D	4,000	\$3,100	.....
H	5,000	3,500	.....

NEW YORK—Tegetmeir & Relp, New York.

Model	Capacity Pounds	Chassis Price	Complete Price
M	3,000	\$2,600	.....
N	4,000	2,800	.....

NILES—Niles Motor Truck Co., Pittsburgh, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
E	4,000	\$3,000	.....

NOBLE—Noble Motor Truck Corp., Kendallville, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
B-30	3,000	.....	.....
D-50	5,000	.....	.....
D-70	7,000	.....	.....

NORTHWAY—Northway Motors Corp., Natick, Mass.

Model	Capacity Pounds	Chassis Price	Complete Price
B-2	4,000	.....	.....
B-3	7,000	.....	.....

NORTHWESTERN—Starr Carriage Co., Seattle, Wash.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	\$2,400	.....
W T	4,000	3,300	.....

NORWALK—Norwalk Motor Car Co., Martinsburg, W. Va.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	2,000	\$1,695	.....
.....	3,000	2,025	.....

President, C. B. Skadden.
Treasurer, L. E. Ernst.
Secretary, L. E. Ernst.
Sales Man., G. W. Gothrope.

Ad. Man., G. W. Gothrope.
Pur. Agent, M. Yontz.
Prod. Man., Mr. Boyer.

OGDEN—Ogden Motor & Supply Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
A-1	3,000	\$2,350	.....
C-2	5,000	2,995	.....

O. K.—Oklahoma Auto Mfg. Co., Okay, Okla.

Model	Capacity Pounds	Chassis Price	Complete Price
H-1	3,000	\$2,675	.....
K-1	3,000	2,675	.....
L-1	5,000	3,450	.....
M-1	7,000	4,250	.....

President, C. Harris.
Vice Pres., E. J. Dunnigan.
Vice Pres., W. J. Cole.
Treasurer, A. C. Trumbs.
Secretary, F. J. Downie.
Sales Man., T. G. Smith.

Ad. Man., T. G. Smith.
Pur. Agent, G. W. Meyers.
Prod. Man., J. Larson.
Export Man., T. G. Smith.
Chief Engineer, Everett Cook.

OLD RELIABLE—Old Reliable Motor Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,500	\$2,350	.....
B	5,000	3,250	.....
C	7,000	4,000	.....
D	10,000	5,000	.....
L	14,000	6,000	.....

President, G. H. Hollandsworth.
Vice Pres., V. P. Dunlap.

Pur. Agent, A. Soemod.
Chief Engineer, L. E. Brookes.

MARSHALL—Marshall Mfg. Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
2	4,000	\$1,750	.....

MASTER—Master Truck, Inc., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
J-W	3,000	\$2,690	.....
D	5,000	5,000	.....
D	4,000	3,245	.....
A	7,000	4,190	.....
B	10,000	5,290	.....
D T-Tractor	12,000	3,740	.....

MAXWELL—Maxwell Motor Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	3,000	\$1,185	.....

MENOMINEE—Menominee Motor Truck Co. of Wisconsin, Menominee, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
H T	2,000	\$2,080	.....
H	3,000	2,725	.....
D	4,000	3,245	.....
G	7,000	4,270	.....
J	10,000	5,450	.....

MOLINE—Moline Plow Co., Moline, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
10	3,000	\$2,250	.....

MORELAND—Moreland Motor Truck Co., Los Angeles, Cal.

Model	Capacity Pounds	Chassis Price	Complete Price
19-N	2,000	\$2,600	.....
19-B	3,000	2,930	.....
19-C	5,000	3,775	.....
19-G	8,000	4,975	.....
19-J	10,000	5,350	.....

President, R. H. Raphael.
Vice Pres., J. C. Kubach.
Treasurer, J. D. Armer.
Secretary, J. D. Armer.
Sales Man., P. H. Mallory.

Ad. Man., H. A. Faulkner.
Export Man., T. Hobgood.
Pur. Agent, F. G. Whatty.
Prod. Man., R. Reverdy.
Chief Engineer, J. Wiggers.

MUSKEGON—Muskegon Engine Co., Muskegon, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	\$2,325	.....

MUTUAL—Mutual Truck Co., Sullivan, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
2-A	4,000	\$3,450	.....
2-A P	5,000	4,150	.....

President, Robert Petrie.
Vice Pres., Roy O. Anderson.
Vice Pres., Homer Steele.
Treasurer, Frank McCoy.
Secretary, Frank McCoy.

Sales Man., Robert Petrie.
Ad. Man., R. R. Shuman.
Pur. Agent, Roy O. Anderson.
Prod. Man., Roy O. Anderson.
Engineer, E. L. Merch, Jr.

NAPOLEON—Napoleon Motors Co., Traverse City, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
M-7	1,500	\$1,500	.....
M-9	2,000	1,535	.....
M-11	3,000	1,860	.....

President, W. J. Chase.
Vice Pres., W. G. Rath.

Ad. Man., C. D. Peet.
Pur. Agent, W. A. Schmaltz.

Secretary, G. Hollandsworth. Export Man., M. Wright.
Sales Man., V. P. Dunlap. Prod. Man., A. Soemod.
Ad. Man., M. Wright.

OLDSMOBILE—Olds Motor Works, Lansing, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
L	1,500	\$1,250	.....

ONEIDA—Onelda Motor Truck Co., Green Bay, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
A-9	2,500	\$2,350	.....
B-9	3,500	2,950	.....
C-9	4,500	3,390	.....
D-9	7,000	4,345	.....
E-9	10,000	5,460	.....

President, Lafayette Markle. Ad. Man., H. T. Shannon.
Vice Pres., F. E. Burrall. Pur. Agent, H. C. Pray.
Treasurer, Mitchells Joannes. Prod. Man., F. H. Bogard.
Secretary, Samuel Cady. Service Man., R. E. Widrig.
Sales Man., H. J. Butler.

ORLEANS—New Orleans Motor Truck Mfg. Co., New Orleans, La.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,750	.....
B	5,000	3,250	.....
C	7,000	4,100	.....

President, H. Connecke. Sales Man., M. Rourke.
Vice Pres., J. Cullen. Ad. Man., Miss K. Sims.
Treasurer, V. O. Grosz. Pur. Agent, J. Mascoletti.
Secretary, V. O. Grosz. Chief Engineer, G. H. May.

OSHKOSH—Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
A & A A	4,000	\$3,850	.....

President, W. A. Besserdich. Pur. Agent, L. E. Perkins.
Treasurer, J. T. Mosling. Prod. Man., A. Wolf.
Secretary, B. A. Mosling. Export Man., Homer Hilton.
Sales Man., Homer Hilton. Chief Engineer, F. J. Sullivan.
Ad. Man., Homer Hilton.

PACKARD—Packard Motor Car Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
E C	\$3,850	.....
E D	4,900	.....
E F	4,950	.....
E X	4,650	.....
E Y	6,650	.....
6-E	12,000	5,700	.....

President, Alvin Macauley. Sales Man., R. E. Chamberlain.
Vice Pres., E. F. Roberts. Sales Man., Harry Gardner.
Vice Pres., J. G. Vincent. Ad. Man., W. H. Halmer.
Vice Pres., H. H. Hills. Export Man., F. H. Cardway.
Treasurer, F. Jandron. Pur. Agent, Mr. Boynton.
Secretary, F. R. Robinson.

PAIGE—Paige-Detroit Motor Car Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
52-19	3,000	\$2,880	.....
54-20	5,000	3,400	.....
51-18	7,000	4,285	.....

President, H. M. Jewett. Treasurer, G. W. Lee.
Vice Pres., F. S. Jewett. Secretary, W. B. Cady.
V. Pres., Prod., W. A. Wheeler. Sales Man., H. A. Conlon.
Vice Pres., Sales, H. Krohn. Ad. Man., H. C. Dart.
Vice Pres., Pur., T. Bradley. Chief Engineer, G. C. Mather.
Vice Pres., Eng., A. Bachle. Truck Engin'r, T. W. Warnock.

PARKER—Parker Motor Truck Co., Milwaukee, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
F-20	4,000	\$3,500	.....
J-20	7,000	4,400	.....
M-20	10,000	5,500	.....

President, A. J. Mayer. Pur. Agent, W. F. Port.
Vice Pres., F. H. Parker. Prod. Man., J. K. Sinyard.
Treasurer, T. E. Francey. Chief Engineer, A. W. Wiener.
Secretary, T. E. Francey.

PATRIOT—Patriot Motors Co., Lincoln, Neb.

Model	Capacity Pounds	Chassis Price	Complete Price
Revere	2,000	\$1,785	.....
Lincoln	4,000	2,450	.....
Washington	6,000	3,450	.....

PIERCE-ARROW—Pierce-Arrow Motor Car Co., Buffalo, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
X-5	4,000	\$3,750	.....
W-2	7,000	4,950	.....
R-10	10,000	5,700	.....

President, George Mixter. Ad. Man., E. G. Rounds.
Vice Pres., George R. Graham. Export Man., W. Y. Rabb.
Treasurer, M. E. Forbes. Pur. Agent, Floyd Smith.

Secretary, B. C. Pearson.
Sales Man., R. O. Patten.

Prod. Man., H. W. Lake.
Chief Engin'r, David Ferguson.

PIONEER—Pioneer Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
AA	2,000	\$1,550	.....

President, Otto Frier. Secretary, Richard Voge.
Vice Pres., M. R. Lowenstein. Pur. Agent, Otto Frier.
Vice Pres., W. Alpin. Prod. Man., Samuel Miller.
Treasurer, Otto Frier.

PITTSBURGH—Pittsburgh Truck Mfg. Co., Pittsburgh, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
B	5,000	\$3,500	.....

President, F. P. Sawders. Pur. Agent, F. P. Sawders, Jr.
Treasurer, Joseph G. Murray. Chief Engineer, L. A. Sawders.
Secretary, Joseph G. Murray. Export Man., J. C. Sawders.
Ad. Man., F. P. Sawders.

PONY—Minnesota Machinery & Foundry Co., Minneapolis, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	250	\$320	.....

POWER—Power Truck & Tractor Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
B	7,000	\$4,300	.....

President, L. R. Seton. Ad. Man., K. Lans.
Vice Pres., W. McGoldrich. Export Man., R. S. Barnes.
Treasurer, C. Seton. Pur. Agent, C. Seton.
Secretary, C. Seton. Chief Engineer, W. McGoldrich.
Sales Man., K. Lans.

PREMOCAR—Preston Mfg. Co., Birmingham, Ala.

RAINIER—Rainier Motor Corp., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
R-11	1,500	\$2,150	.....
R-19	2,000	2,350	.....
R-16	3,000	2,600	.....
R-18	4,000	2,950	.....
.....	5,000	3,400	.....
R-15	7,000	4,500	.....

President, John T. Rainier. Sales Man., P. N. Lineberger.
Vice Pres., P. N. Lineberger. Ad. Man., S. W. Steinberg.
Treasurer, John Rainier. Pur. Agent, J. McCord.
Secretary, J. A. Rainier. Export Man., P. N. Lineberger.

RANGER—Southern Motors Mfg. Co., Ltd., Houston, Tex.

Model	Capacity Pounds	Chassis Price	Complete Price
C	4,000	\$2,575	.....

President, J. E. Blevins. Pur. Agent, W. E. Hutchinson.
Vice Pres., B. D. Cahn. Ad. Man., Brom Ridely.
Treasurer, C. E. Shively. Prod. Man., D. G. Smith.
Secretary, M. J. Kain. Chief Engin'r, C. A. Obermaier.
Sales Man., W. O. Browne.

RELIANCE—Reliance Motor Truck Co., Appleton, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
10	3,000	\$2,500	.....
20	5,000	2,200	.....

President, A. G. Bousenitz. Secretary, J. W. Balliet.
Vice Pres., Charles Schmidt. Gen. Man., Henry Wagner.
Treasurer, J. W. Balliet.

REO—Reo Motor Car Co., Lansing, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
F	1,500	\$1,350	.....

President, R. E. Olds. Secretary, D. E. Bates.
Vice Pres., R. H. Scott. Sales Man., R. E. Reuchaw.
Vice Pres., H. T. Thomas. Pur. Agent, G. E. Smith.
Treasurer, D. E. Bates. Prod. Man., H. C. Teel.

REPUBLIC—Republic Motor Truck Co., Almas, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
10	2,000	\$1,695	.....
11 X	3,000	2,195	.....
19	5,000	2,795	.....
20	7,000	3,845	.....

President, John N. Willys. Ad. Man., Mr. Swiss.
Vice Pres., Frank E. Smith.

REYNOLDS—Reynolds Motor Truck Co., Mt. Clemens, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
3-A	3,000	\$2,650	.....
5-A	5,000	3,350	.....
7-A	7,000	4,350	.....
10-A	10,000	5,350	.....

RIKER—Locomobile Co. of America., Bridgeport, Conn.

Model	Capacity Pounds	Chassis Price	Complete Price
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Model	Capacity Pounds	Chassis Price	Complete Price
B	6,000	\$4,600
BB	8,000	4,700
President, Emlen Hare.		Vice Pres., O. E. Hunt.	
Vice Pres., Henry Lansdale.		Treasurer, F. R. Hickman.	
Vice Pres., H. D. Church.		Secretary, F. R. Hickman.	

ROWE—Rowe Motor Mfg. Co., Lancaster, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
C W	3,000	\$3,000	.....
C D W	4,000	3,300	.....
G S W	6,000	4,150	.....
H W	8,000	4,500	.....
F W	10,000	5,500	.....
President, Samuel Rowe.		Sales Man., L. S. Allen.	
Vice Pres., L. S. Allen.		Pur. Agent., R. E. Leiter.	
Secretary, J. C. Mateer.		Prod. Man., Chas. Wunderlich.	
Treasurer, J. K. Ressler.		Export Man., L. S. Allen.	
Ad. Man., L. S. Allen.			

ROYAL—Royal Motor Truck Co., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	2,000	.....	.....
.....	5,000	.....	.....
.....	7,000	.....	.....
.....	10,000	.....	.....
.....	12,000	.....	.....
.....	14,000	.....	.....

SAMSON—Samson Tractor Co., Janesville, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
15	1,500	\$865	.....
25	2,500	1,185	.....
Gen. Man., J. A. Craig.		Ad. Man., D. W. Robinson.	
As. Gen. Man., A. R. Glancy.		Pur. Agent, C. R. Leonard.	
Compt., W. F. Woodbury.		Prod. Man., A. D. King	
As. Secretary, S. J. Zapinske.		Export Man., General Motors	
Sales Man., C. C. Craig.		Export Co.	

SANDOW—Sandow Motor Truck Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
G	2,000	\$2,195	.....
C G	3,000	2,480	.....
I	4,000	2,575	.....
J	5,000	3,175	.....
M	7,000	4,095	.....
L	10,000	4,775	.....
President, T. L. Beach.		Sales Man., W. G. Shultz.	
Vice Pres., Marks Aaron.		Ad. Man., T. L. Beach.	
Vice Pres., N. C. Anderson.		Export Man., W. B. Arthur.	
Vice Pres., O. W. Billion.		Pur. Agent, C. L. Pearson.	
Treasurer, T. L. Beach.		Prod. Man., C. L. Pearson.	
Secretary, G. L. Poundstone.		Chief Engineer, C. L. Pearson.	

SANFORD—Sanford Motor Truck Co., Syracuse, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
W-25	5,000	\$3,350	.....
W-35	7,000	4,200	.....
W-50	10,000	5,100	.....

SCHLEICHER—Schleicher Motor Vehicle Co., New York.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	6,000	\$3,500	.....
.....	10,000	4,500	.....

SCHWARTZ—Schwartz Motor Truck Co., Reading, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
B	3,000	\$2,600	.....
C	5,000	3,200	.....
D	10,000	4,900	.....

SELDEN—Selden Truck Corp., Rochester, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
1½ A	3,000	\$2,360	.....
2½ A	5,000	3,425	.....
3½ A	7,000	4,175	.....
5 A	10,000	5,600	.....

SENECA—Seneca Motor Car Co., Fostoria, O.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,000	\$1,060	.....

SERVICE—Service Motor Truck Co., Wabash, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
220	2,000	\$2,215	.....
31	3,000	2,985	.....
36	3,000	3,415	.....
51	5,000	3,475	.....
71	7,000	4,285	.....
76	7,000	4,485	.....
101	10,000	5,275	.....

SHAW—Walden W. Shaw Livery Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
M-2	1,500	\$1,700	.....
M-4	2,500	1,850	.....
M-3	6,000	2,950	.....

SIGNAL—Signal Motor Truck Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
N F	2,000	\$2,475	.....
H	3,000	2,925	.....
J	5,000	3,275	.....
M	7,000	4,275	.....
R	10,000	5,300	.....

President, Joseph G. Healett. Sales Man., M. B. Hoagland.
Vice Pres., M. B. Hoagland. Ad. Man., M. B. Hoagland.
Treasurer, M. B. Hoagland. Pur. Agent, H. S. Sternberg.
Secretary, H. H. Emmons.

SOUTHERN—Southern Auto Mfg. Co., Memphis, Tenn.

Model	Capacity Pounds	Chassis Price	Complete Price
10	2,000	\$2,090	.....
15	3,000	2,590	.....

STANDARD—Standard Motor Truck Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
I K	2,000	.....	.....
76	5,000	.....	.....
66	7,000	.....	.....
86	10,000	.....	.....

STERLING—Sterling Motor Truck Co., Milwaukee, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
1½	3,000	\$3,200	.....
2	4,000	3,500	.....
2½	5,000	3,650	.....
3½	7,000	4,650	.....
5-Chain	10,000	6,000	.....
5-Worm	10,000	5,500	.....
7½-Chain	15,000	6,500	.....

President, Robert Hayssen. Ad. Man., William Reece.
Vice Pres., E. M. Sternberg. Export Man., Frank Luick.
Treasurer, O. E. Held. Pur. Agent, G. Hassebreiter.
Secretary, Frank Luick. Prod. Man., William Sternberg.
Sales Man., John Tracy.

STEWART—Stewart Motor Corp., Buffalo, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
11	1,500	\$1,295	.....
7	4,000	2,495	.....
7-X	5,000	2,575	.....
12	2,000	1,650	.....
9	3,000	1,995	.....
10	7,000	3,395	.....

President, T. R. Lippard. Pur. Agent, William Bowen.
Vice Pres., R. G. Stewart. Prod. Man., Fred Suttner.
Treasurer, R. P. Sentz. Chief Engineer, A. Maynard.
Secretary, R. P. Sentz. Export Man., Melchion, Arm-
Sales Man., Edward Roberts. strong & Desseur, 106 Broad
Ad. Man., R. G. Hatch. St., New York.

STOUGHTON—Stoughton Wagon Co., Stoughton, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
Speed Truck	2,000	\$1,995	.....
B	3,000	2,350	.....
D	4,000	2,800	.....
E	6,000	3,600	.....

President, T. D. Vea. Sales Man., Fred Crebbin, Jr.
Vice Pres., H. Beattie. Ad. Man., Fred Crebbin, Jr.
Treasurer, M. Vea. Pur. Agent, H. H. Kessler.
Secretary, W. C. Heggelmeyer. Export Man., Fred Crebbin, Jr.

SUCCESS—Webberville Truck Co., Webberville, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
B	5,000	\$2,850	.....

SULLIVAN—Sullivan Motor Truck Corp., Rochester, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
F	3,000	\$2,350	.....
E	4,000	2,850	.....
H	7,000	.....	.....

SUPER—O'Connell Motor Truck Co., Waukegan, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
50	5,000	\$3,300	.....
100	10,000	5,300	.....

President, William L. O'Connell. Secretary, D. J. O'Connell.
Vice Pres., L. G. Bartlett. Chief Engineer, L. G. Bartlett.
Treasurer, W. L. O'Connell.

SUPERIOR—Superior Motor Truck Co., Atlanta, Ga.

Model	Capacity Pounds	Chassis Price	Complete Price
B	2,000	\$1,800	.....
E	4,000	2,750	.....
President, E. M. Hillingham. Secretary, E. G. Deckner.			
Vice Pres., E. G. Deckner. Prod. Man., F. Fappler.			
Vice Pres., E. D. Hillingham. Pur. Agent, E. D. Hillingham.			
Treasurer, E. G. Deckner. Chief Engineer, F. Fappler.			

TEXAN—Texas Motor Car Association, Fort Worth, Tex.

Model	Capacity Pounds	Chassis Price	Complete Price
T-39	2,000	\$1,425	.....

TIFFIN—The Tiffin Wagon Co., Tiffin, O.

Model	Capacity Pounds	Chassis Price	Complete Price
G W	3,000	\$2,695	.....
M W	5,000	3,580	.....
T W	7,000	4,760	.....
T W	10,000	5,850	.....
U W	12,000	6,050	.....
President, George D. Loomis. Ad. Man., H. C. France.			
Vice Pres., Charles Shelby. Pur. Agent, H. C. Deinzer.			
Treasurer, H. C. France. Export Man., H. C. France.			
Sales Man., H. C. France. Prod. Man., George Horner.			

TITAN—Titan Truck Co., Milwaukee, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
3½	7,000	\$4,550	.....
6	12,000	5,400	.....

TOWER—Tower Motor Truck Co., Greenville, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
J 1½	3,000	\$3,000	.....
H 2½	5,000	3,475	.....
G 3½	7,000	4,400	.....
.....	10,000	.....	.....
President, R. J. Tower. Sales Man., J. Sandwich.			
Vice Pres., F. E. Davis. Pur. Agent, A. E. Krigsted.			
Treasurer, S. A. Booth. Prod. Man., A. E. Carlin.			
Secretary, S. A. Booth.			

TRAFFIC—Traffic Motor Truck Corp., St. Louis, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
C	4,000	\$1,595	.....
President, Guy Wilson. Export Man., H. E. Small.			
Vice Pres., T. C. Brandle. Pur. Agent, F. Jones.			
Treasurer, H. E. Manner. Prod. Man., E. E. Devine.			
Sales Man., H. H. Hawke.			

TRANSPORT—Transport Truck Co., Mt. Pleasant, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
20	2,000	\$1,850	.....
30	3,000	2,050	.....
50	4,000	2,585	.....
70	7,000	4,195	.....
T-Tractor	10,000	2,750	.....
President, M. A. Holmes. Ad. Man., F. E. Edman.			
Vice Pres., H. E. Chatterton. Export Man., Charles A. Kipp.			
Treasurer, A. E. Gorhour. Pur. Agent, C. B. Marshall.			
Secretary, A. E. Gorhour. Prod. Man., H. N. Brainard.			
Sales Man., F. E. Engle. Chief Engineer, N. A. Wise.			

TRAYLOR—Traylor Engineering & Mfg. Co., Cornwells, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
B	2,000	\$2,075	.....
D	5,000	3,375	.....
C	3,000	2,875	.....

TRIANGLE—Triangle Motor Truck Co., St. Johns, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
AA	1,500	\$1,600	.....
A	3,000	2,350	.....
C	4,000	2,700	.....
B	5,000	2,950	.....
President, Eugene Hart. Ad. Man., F. G. Post.			
Vice Pres., C. S. Clark. Pur. Agent, E. G. Hulse.			
Treasurer, F. C. Burk. Prod. Man., Homer Press.			
Secretary, Frank Stineblower. Chief Engineer, E. G. Hulse.			
Sales Man., F. C. Burk.			

T. M. C.—Triumph Motors Corp., Buffalo, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
Special	2,000	.....	.....
.....	2,000	.....	.....
.....	4,000	.....	.....
.....	6,000	.....	.....
.....	8,000	.....	.....

TRIUMPH—Triumph Truck & Tractor Co., Kansas City, Mo.

Model	Capacity Pounds	Chassis Price	Complete Price
H	3,000	.....	.....

Model	Capacity Pounds	Chassis Price	Complete Price
H C	3,000	.....	.....
H B	4,000	.....	.....
President, Robert Cross. Pur. Agent, Ray Franklin.			
Vice Pres., James B. Young. Prod. Man., Roy Gould.			
Treasurer, Robert Cross. Chief Eng., Roy Gould.			
Secretary, James E. Young.			

TWIN CITY—Minneapolis Steel & Mch. Co., Minneapolis, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
B W	4,000	.....	.....
A W	7,000	.....	.....

TWIN CITY F. W. D.—Twin City Four Wheel Co., St. Paul, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
B	7,000	\$4,750	.....
A	10,000	5,250	.....

ULTIMATE—Vreeland Motors Co., Inc., Newark, N. J.

Model	Capacity Pounds	Chassis Price	Complete Price
A J	4,000	\$3,250	.....
B	5,000	3,750	.....
B L	6,000	3,850	.....
A	3,000	3,200	.....

UNION—Union Motor Truck Co., Bay City, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
B	5,000	\$3,150	.....
H	8,000	3,975	.....
J	12,000	5,450	.....
President, James Tanner. Ad. Man., L. O. Smith.			
Vice Pres., Howard Woodworth. Pur. Agent, O. M. Anderson.			
Treasurer, George Beaulieu. Prod. Man., J. A. Etzold.			
Secretary, Homer Buck. Chief Engineer, J. B. Brown.			
Sales Man., L. O. Smith.			

UNITED—United Motors Co., Grand Rapids, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,445	.....
B	5,000	3,150	.....
C	7,000	3,975	.....
V	10,000	5,100	.....
F W D	6,000	4,500	.....

U. S.—United States Motor Truck Co., Cincinnati, O.

Model	Capacity Pounds	Chassis Price	Complete Price
C	4,000	.....	.....
W	3,000	.....	.....
P	4,000	.....	.....
R	6,000	.....	.....
S	8,000	.....	.....
T	12,000	.....	.....

UNIVERSAL—Universal Service Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
D	3,000	2,800	.....
G	4,000	\$2,175	.....
A	6,000	3,700	.....

VELIE—Velie Motors Corp., Moline, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
46-52	3,500	\$2,200	.....
26-B	7,000	3,900	.....
President, W. I. Velie. Ad. Man., H. T. Wheelock.			
Vice Pres., F. E. Bradfield. Export Man., W. L. Velie, Jr.			
Treasurer, A. T. Huesing. Pur. Agent, F. D. Soper.			
Secretary, F. E. Bradfield. Prod. Man., H. L. Hazard.			
Sales Man., R. E. Montgomery. Chief Engineer, J. V. Coy.			

VIM—Vim Motor Truck Co., Philadelphia, Pa.

Model	Capacity Pounds	Chassis Price	Complete Price
29	1,000	\$1,355	.....
30	1,000	1,550	.....
31	2,000	2,475	.....
22	4,000	3,150	.....
23	6,000	3,950	.....

WALKER-JOHNSON—Walker-Johnson Truck Co., Woburn, Mass.

Model	Capacity Pounds	Chassis Price	Complete Price
President, W. J. Walker.			
Treasurer, W. J. Walker.			
Secretary, J. H. O'Neil.			

WALTER—Walter Motor Truck, New York.

Model	Capacity Pounds	Chassis Price	Complete Price
S	10,000	\$5,600	.....
B	15,000	5,750	.....
President, William Walter. Ad. Man., W. J. Aitken.			
Vice Pres., W. J. Aitken. Pur. Agent, M. Walter.			

Treasurer, Maurice Walter.
Secretary, Maurice Walter.
Sales Man., W. A. Aitken.

Prod. Man., E. L. Walter.
Export Man., W. J. Aitken.

WALTHAM—Waltham Motors Corp., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
E	3,000	\$2,500	.....

President, D. W. Henry.
Treasurer, W. T. Fritts.
Secretary, E. Lowe.
Sales Man., E. H. Lowe.

Pur. Agent, C. J. Konvanlinka.
Ad. Man., E. H. Lowe.
Prod. Man., D. G. Jack.

WARD LA FRANCE—Ward La France Truck Co., Inc., Elmira, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
2-B	5,000	\$3,590	.....
3-A	10,000	5,590	.....
4-A	7,000	4,690	.....

President, A. W. La France.
Vice Pres., J. R. Burton.
Treasurer, C. K. Hevener.
Secretary, C. K. Hevener.

Sales Man., G. E. De Long.
Ad. Man., J. M. Livingston.
Pur. Agent, D. R. Parfitt.

WARE—Ware Twin Engine Co., Minneapolis, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	6,000	.....	.....
.....	10,000	.....	.....

Vice Pres., Asa Briggs.
Treasurer, J. F. Drew.
Secretary, J. F. Drew.

Prod. Man., J. L. Ware.
Chief Engineer, J. L. Ware.
Export Man., J. L. Ware.

WATSON—Watson Products Corp., Canastota, N. Y.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,100	\$1,750	.....
Tractor	10,000	4,050	.....

President, A. A. Keesler.
Vice Pres., Herman Casler.
Treasurer, H. J. Clark.
Secretary, C. C. Keesler.

Sales Man., L. E. Burrell.
Ad. Man., L. E. Burrell.
Pur. Agent, M. G. Wagner.
Prod. Man., A. Humphery.

WELLS—Evans Truck & Axle Co., Auburn, Ind.

Model	Capacity Pounds	Chassis Price	Complete Price
D	2,000	.....	.....
C-1	4,000	.....	.....

WESTERN—Western Truck Mfg. Co., Chicago, Ill.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	1,400	\$4,600	.....

WHARTON—Wharton Motors Corp., Dallas, Tex.

Model	Capacity Pounds	Chassis Price	Complete Price
A	3,000	\$2,600	.....
B	5,000	3,600	.....

President, T. P. Wharton.
Vice Pres., W. E. Grigsly.
Treasurer, C. W. Williams.
Secretary, H. D. Heckman.
Sales Man., W. E. Grigsly.

Ad. Man., C. W. Williams.
Prod. Man., Carroll M. Aument.
Export Man., W. E. Grigsley.
Chief Eng., Carroll M. Aument.

WHITE—White Co., Cleveland, O.

Model	Capacity Pounds	Chassis Price	Complete Price
15	1,500	\$2,600	.....
20	4,000	3,450	.....
40	6,000	4,500	.....
45	10,000	5,000	.....

WHITE HICKORY—White Hickory Wagon Mfg. Co., Atlanta, Ga.

Model	Capacity Pounds	Chassis Price	Complete Price
E	2,000	\$2,450	.....
H	3,000	2,750	.....
K	5,000	3,850	.....

President, B. M. Blount.
Vice Pres., E. R. Dubose.
Treasurer, E. D. Duncan.
Secretary, E. D. Duncan.

Sales Manager, H. C. Futch.
Pur. Agent, E. G. Gunster.
Prod. Man., E. G. Gunster.
Chief Engineer, E. G. Gunster.

WICHITA—Wichita Motors Co., Wichita Falls, Tex.

Model	Capacity Pounds	Chassis Price	Complete Price
L	3,000	\$2,350	.....
M	4,000	2,750	.....
R	5,000	2,950	.....
O	7,000	3,750	.....
S	10,000	5,400	.....
K	1,000	.....	.....
R X	5,000	.....	.....

WILCOX—Wilcox Motor Co., Minneapolis, Minn.

Model	Capacity Pounds	Chassis Price	Complete Price
A	2,000	\$2,100	.....
B	3,000	2,775	.....
C	5,000	3,300	.....
E	7,000	4,100	.....
F	10,000	5,200	.....

WILSON—J. C. Wilson Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
F	3,000	\$2,650	.....
E	5,000	3,300	.....
G	7,000	4,300	.....
H	10,000	5,200	.....

WINTHER—Winther Motor Truck Co., Kenosha, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
751	2,000	\$1,795	.....
39	3,000	2,450	.....
430 F. W. D.	3,000	2,850	.....
49	4,000	3,250	.....
450 F. W. D.	5,000	3,690	.....
70	7,000	4,200	.....
109	10,000	5,250	.....
140	14,000	5,960	.....

President, M. P. Winther.
Vice Pres., William Martinson.
Vice Pres., George Drake Smith.
Treasurer, William Henrichs.
Secretary, C. T. Abbott.
Sales Man., Geo. Drake Smith.

Ad. Man., M. M. Lowe.

Export Man., C. H. Meeker.

Pur. Agent, W. J. Swift.

Prod. Man., C. C. Abbott.

Chief Eng'r B. L. Downing.

WISCONSIN—Wisconsin Truck Co., Longanville, Wis.

Model	Capacity Pounds	Chassis Price	Complete Price
B	3,000	\$1,750	.....
C	4,000	2,350	.....
E	5,000	2,600	.....

WITT-WILL—Witt-Will Co., Washington, D. C.

Model	Capacity Pounds	Chassis Price	Complete Price
N	3,000	\$2,250	.....
P	5,000	3,250	.....

President, W. W. Griffith.
Treasurer, J. M. Dugan.
Secretary, J. M. Dugan.

Sales Man., George Cole.

Pur. Agent, H. C. Humphery.

Prod. Man., D. Leister.

WOLVERINE—American Commercial Car Co., Detroit, Mich.

Model	Capacity Pounds	Chassis Price	Complete Price
C	3,000	\$2,380	.....
D	4,000	2,650	.....

President, H. C. Wiedeman.
Vice Pres., Fred Kahl.
Treasurer, H. A. Otto.
Secretary, George P. Good.
Sales Man., H. C. Wiedeman.

Ad. Man., H. C. Wiedeman.

Pur. Agent, F. J. Huettelman.

Export Man., H. C. Wiedeman.

Prod. Man., H. A. Schmid.

YALE—The Yale Motor Truck Co., New Haven, Conn.

Model	Capacity Pounds	Chassis Price	Complete Price
.....	4,000	\$2,800	.....

President, Henry Dupee.
Vice Pres., Frank Dupee.
Treasurer, Henry Dupee.
Secretary, Raymond Dupee.
Sales Man., Eugene Henry.

Ad. Man., John Wilmot.

Pur. Agent, Raymond Dupee.

Prod. Man., Frank Dupee.

Chief Engineer, Henry Dupee.

YOUNG—Young Motor Truck Co., Cleveland, O.

9,295,252 CARS AND TRUCKS.

The B. F. Goodrich Rubber Co. has obtained the official motor vehicle registrations from the various states, which shows that there are now 9,295,252 passenger cars and trucks in use in the United States. This is an increase of 1,691,236, or 22.2 per cent., over the figures at the end of 1919. New York has 692,174 registered and Ohio 618,000.

There is now one motor vehicle for every 11.8 persons as compared with one for every 13.9 a year ago. If this rate of increase continues there will be one for every family in five years. Nebraska now leads with one car for every 5.9 persons. If this average were maintained throughout the country there would be now 17,912,000 cars and trucks in use. Why shouldn't this condition prevail?

WHO'S WHO ON SALES FIRING LINE

SELLING TRUCKS BY MAIL NOT PRACTICAL.

Robert S. Stewart, vice president of the United States Motor Truck Co., Cincinnati, O., scoffs at the prediction that motor trucks will be sold entirely by mail at a not distant date. He says that such irregular service would never take the place of the constant personal attention which prospective and actual truck buyers should receive from the manufacturer. "A manufacturer's interest in the truck owner ought to begin before the sale and stop—never," says Stewart.

"You cannot do without the transportation engineer, for that is what every truck dealer should be. The things that he does for the truck owner cannot be done by anybody else or in any other way.

"The dealer counsels with his prospect in order to analyze the latter's needs, so that he may be able to give him exactly what he ought to have.

"In short, the dealer has to maintain a constant, healthful and effective contact with the customer."

C. L. MASON SALES MANAGER FOR DENMAN MYERS CORDS.

General Manager Denman of the Denman Myers Cord Tire Co., with general offices at Cleveland, and factory at Warren, O., announces that production will be more than doubled at once and in the same breath makes known the fact that C. L. Mason, one of the best known merchandising executives in the tire industry, has been appointed sales manager.

Mr. Mason has been sales manager for some of the largest rubber concerns in the country and his wide experience and knowledge of his profession was recognized by the company's executive committee which selected him over a large list of unusually choice applicants for this important post.



C. L. Mason, Sales Manager of the Denman Myers Cord Tire Co.



O. M. Vett dropped in with a Happy New Year for all and his good cheer gave us a thirst for knowledge without satisfying any physical thirst.

"What's the big casino in a truck salesman's pack of cards," we inquired off-hand?

"It's the truck itself," he answered without shifting speeds.

"A good truck is a work of art," he continued. "It has no decorations, no spectacular colors, no striking curves, no vanity cases or other frills. It's beautiful in its massiveness, its solidarity, its strong-hewn lines, its suggestion of power. That's what the buyer is paying for. Power!"

"Get your man to see the truck and you've got him staggering. No person who is thinking of buying a truck can see one that has just emerged from the factory without a longing to own it. Once interest is aroused the ownership bug begins to bite and then it's only a question of when."

"Of course it's nice to drive the truck to the business place of the prospect and bring him out in it or even do a job for him. This latter demonstration is a result getter."

"It is quite often easier to get him to your shop, a habit you should try to make him cultivate, particularly when you sell service, parts, accessories, etc. Your side line may be just the bait to interest him temporarily."

"Most truck owners have an auto. You might suggest to him that the job has just arrived fresh in your shop and that he'll be driving by the next day or the day after and might care to stop in for a minute. If he is a single truck owner and drives his own machine he is even more apt to be passing your place. Get him to drop in and you have done four-fifths of your selling job."

"There is another point to this performance which is quite often overlooked. The truck dealer or salesman is a bigger man in his own bailiwick than he is when a caller at the other fellow's place of business. Contrawise the buyer who looms so big in his home office does not feel quite so efficacious when he's out of his element. The salesman can put things over at home that he can't abroad. Get your man in your diggings and his self-confidence goes down as yours goes up. Wing him when his dauber's down."

F. B. WILLIS SALES MANAGER FOR DUPLEX TRUCK CO.

President and General Manager H. M. Lee of the Duplex Truck Co., Lansing, Mich., has appointed Frank B. Willis, a widely known automotive specialist, as sales manager. Mr. Willis took up his new duties Jan. 3. He has been with the business since it came into being and has had experience in its every angle. In recent years he has been merchandizing motor trucks and his recognized ability in this line promises to be a staunch asset for the organization in which his future endeavors have been enlisted.

WHIPPLE WITH REPUBLIC.

Republic Motor Truck Co. has secured A. J. Whipple, a member of the truck committee of the National Automobile Chamber of Commerce, and a former director of the National Association of Sales Managers, as general sales manager. He formerly held a similar post with the Diamond T Truck Co.

Shortly after the appointment of Mr. Whipple, Col. Frank E. Smith, first vice president and general manager of the Republic Motor Truck Co., Inc., announced that he had engaged Forest H. Akers as assistant general sales manager. He will assume entire charge of the Republic field organization. Mr. Akers recently resigned as general sales manager of the Reo Motor Car Co., Lansing, Mich. He has been in the tractor industry and knows the problems of the farmer as well as those of the manufacturer and merchant.

Ernest E. Sieg will also continue as an assistant general sales manager and will have charge of all sales activities, except those of distribution, which Mr. Akers will supervise.



A. J. Whipple, General Sales Manager, Republic Motor Truck Co.

STANDARDIZING HUBS FOR TRUCK FRONT AXLES

What is believed to be most beneficial standardization work ever undertaken by the automotive industry is outlined in an engineering paper entitled "Hub Standardization for Motor Truck Front Axles," prepared and just issued by the Research Engineering Division of the Automotive Wood Wheel Manufacturers' association. This organization has spent considerable money and given the time of its members to compiling this valuable work.

This article is the second of a series. The series is being prepared by Cornelius T. Myers, consulting and research engineer of this association. Mr. Myers' standing in the industry vouches for the impartiality of his viewpoint as well as the soundness of his technical conclusions. At present writing, Mr. Myers has in preparation papers on the following topics: "Hard Wood for Wood Wheels," "Handling of Wood Wheels," "Data for Wood Wheel Specifications" and "Factors of Safety in Wood Wheel Design."

While the article treats particularly of hubs for wood wheels, the adoption of the standard spindle and bearing dimensions accomplishes the desired end for those who wish to use wire wheels, disc wheels or cast metal wheels. The use of wire wheels on motor trucks is practically unknown, but should the wire wheel manufacturer desire to furnish such equipment he can design one series of fixed and loose hubs that will fill all requirements. The manufacturer of disc wheels can also design a single series of hubs which will fill all requirements and fit his particular wheel. The manufacturer of cast metal wheels can design a single series of wheels with hubs to fit the given bearings.

In the case of all these manufacturers any type of wheel can be substituted at any time for any type which happens to be in use. Further, each wheel or hub manufacturer needs but one series of standard wheels and tools to cover the entire motor truck industry.

Today it takes over 200 different hubs to cover the motor truck field in the U.

S. A., and there is absolutely no excuse for continuing this burden to the entire industry.

The accomplishment of this piece of standardization work will be of far-reaching value. Its special advantages follow:

1. It will ultimately retire some hundreds of designs called for by small and non-essential variations in dimensions.

2. It will cheapen axles, bearings and wheels of all kinds.

3. It will reduce the number of spindles to cover a given range of truck sizes.

4. It will add to the reliability of axles, hubs and wheels.

5. It will tend to improve the quality of all wheels by eliminating the great amount of attention that must now be paid to the staggering amount of non-essential variation.

6. It will encourage improvements in wheels of all kinds, because of the volume of business available in any particular size.

7. It will greatly reduce the large investment in stocks of parts carried by parts manufacturers, truck manufacturers and service stations.

8. It will save hundreds of thousands of dollars worth of jig and tool equipment.

9. Inspection will be simple and cheaper.

10. It will enable a truck manufacturer to change from one source of wheel supply to another without changing parts or necessitating an additional set of service parts.

11. Dealers and service stations can furnish the type of wheel which will best suit their trade, with the knowledge that it will interchange on the standard spindle and bearings.

12. If a truck wheel meets with an accident it can be replaced at the nearest service station, regardless of whether or not it happens to be a regular service station for that particular make of truck.

13. The adoption and use of the proposed standards will present a well nigh insuperable barrier to the fly-by-night truck manufacturer who purchases parts on one rating and sells them on a higher one. Before such a man can get into production he must fool his sources of supply on tires, wheels, bearings, hubs and axles. These sources of supply can cooperate in checking up on a manufacturer, and it would be almost a miracle if he could get by them all. But even if he did, he would court exposure the moment he put his trucks on the market, for the trade can check up his vehicles by the very simple means of running them on a scales. If the weights do not agree with the tire rating, Mr. Unscrupulous Manufacturer will have all kinds of difficulty in selling his product, for size of tires more nearly establishes a motor truck rating than any other part (with the possible exception of well designed springs). The felloe and spoke sizes must all check up with the tire sizes, and further investigation (if necessary) will point to spindle diameters, etc. Even a layman can check all these points quite accurately with some S. A. E. leaflets in his hand.

14. It will mean an advantage for American trucks in foreign trade.

While this article covers only motor truck hubs with standard solid tire equipment, the standardization programme carries on much further. Motor truck service on pneumatic tires has been discussed on numerous occasions with truck and parts manufacturers, and while there is no universal agreement on the matter, there is a strong consensus of opinion that when pneumatic tires are used the load ratings for the proposed standard hubs and spindles can be moved up in each case to that of the next larger size. Bearing manufacturers are in agreement with this so far as their product is concerned.

FLEET OF 51 TRUCKS GIVES EXCEPTIONAL SERVICE

The Old Reliable Motor Truck Co., Chicago, Ill., is proud of the performance of the fleet of 51 Old Reliable trucks in the service of the Motor Transporta-

tion Co., 1201 West Lake street, Chicago, nearly a score of which are here shown. These trucks are used under contract.

They vary in size from 1½ to

five-ton capacity.

These trucks have met every demand on their utility and have lived up to their name under conditions of every kind.



Fleet of Old Reliable Trucks Which Is Giving Fine Service in Chicago.

MIDWEST TRUCK AND TRACTOR ENGINE

Factors of strength and safety have been built into every part of the new Midwest heavy duty truck and tractor engine, according to Vice President Lon R. Smith. "This engine is perhaps the first one in this country to be built from the blue prints on up to quantity production, with the sole purpose of developing efficient and dependable power for trucks and tractors—to stand the gaff of the high speed resulting from pneumatic tires on trucks, and to stand the gaff on the continuously heavy strain of plowing with tractors. It is distinctly not an adaptation of a passenger car engine, nor a made-over proposition in any sense."

"Starting from taw," says Mr. Smith, "the Midwest staff has designed and we are now in production on the engine which we know develops greater torque and higher thermal efficiency than any comparable engine. The fact that scores of tractors and truck manufacturers have been making exhaustive tests of our engine, literally trying to 'bust 'em up,' and that our orders for large quantities of these engines are rapidly necessitating plans for doubling our present factory capacity, is an indication of how the Midwest engine has been received by the truck and tractor industry."

"It may be interesting to note briefly some of the points the Midwest claims to superiority. In the first place it may be said our manufacturing facilities are unexcelled and our engineering and testing staffs are the best in the land. The use of only the best materials may be taken for granted. Then I desire to cite the crankshaft, which in our $4\frac{1}{2} \times 6$ inch size is three inches in diameter at the bearings. The connecting rod is belled-out at the bearing, giving great additional strength, and the bearing is full 100 per cent. shimless, grooveless type. The crankshaft is drilled from end to end and oil flows under pressure to all

main and connecting rod bearings, as well as cam shaft bearings. These bearings are grooveless and a film of oil floats through them at all times. It may be noted that the Midwest engine is so constructed that it is easily turned over by hand after the engine is assembled and before it is run in.

"The camshaft is also of extra strength and push rods connect with it by means of hardened steel rollers. These push rods work through tubes which act as breathers from the crank case, carrying oil vapor up along the push rods and into the dust proof cover plate over the rocker arms, bathing these arms in oil vapor constantly. This internal breather arrangement keeps out external dirt and adds much to the life of the engine. The rocker arms operate extra sized valves in the engine head. The head is easily removable for valve grinding and the entire engine is thoroughly accessible.

"One of the strong features of the Midwest engine is the vacuum control of the oil feed, which positively governs the flow of oil according to the load on the engine and not according to the speed. We are in position to make this engine now in three sizes— $4\frac{1}{2} \times 6$ inches, $4\frac{1}{8} \times 5\frac{1}{4}$ inches and $3\frac{1}{2} \times 5$ inches. Our dynamometer tests—and the dynamometer tests of many customers who are testing these engines—show a greater torque, according to displacement, than is shown in comparable engines, and it has thus been demonstrated that the Midwest engine of less piston displacement will do the work heretofore requiring an engine of much greater displacement. The factors of economy in this will be self-evident.

"The adoption of pneumatic tires for trucks up to two tons capacity or a bit over has speeded up transportation, while it has literally ruined thousands and thousands of truck engines. The Midwest engine is guaranteed to function

properly and continuously at a speed of 1500 piston feet per minute—and to stand the gaff and keep out of the junk yard. With such an engine the truck and tractor industry can proceed with its speeding up programme for heavy loads and feel absolutely secure as far as the motive power is concerned. This cannot be said of the made over passenger car type of engine, which unfortunately, continues to be used for this purpose. I maintain that the matter of lack of dependability in the power plant is the dock on which the truck and tractor industry is likely to be wrecked—and the moral is too evident for me to set it down in cold type."

GEARING U. S. SALESMEN FOR BIG DISTRIBUTION JOB.

The United States Motor Truck Co., Cincinnati, O., relying on the merit of its product, and backed by the Akron Advertising Agency Co., Akron, O., has launched a drive to double its business in 1921 and its first step in this direction is an educational campaign aimed at its salesmen by which their efficiency will be geared to mesh with the increased distribution schedule.

Unique methods are being adopted to this end. The full plan is not completed, but will be announced at an early date.

FRANKLIN ENDOWS UNIVERSITY TRANSPORTATION COURSE.

Endowed by H. H. Franklin, president of the Franklin Motor Car Co., Syracuse university has installed a department of transportation. Problems of maintenance and depreciation, loading and speed, competition of the motor car with the horse drawn vehicle, the street car and the steam railroad are considered. Also the relation of the motor car and the constitution and maintenance of streets and highways, as well as other vital defects of motor transportation. The course deals with many practical problems.

GARY TRUCK NOTES.

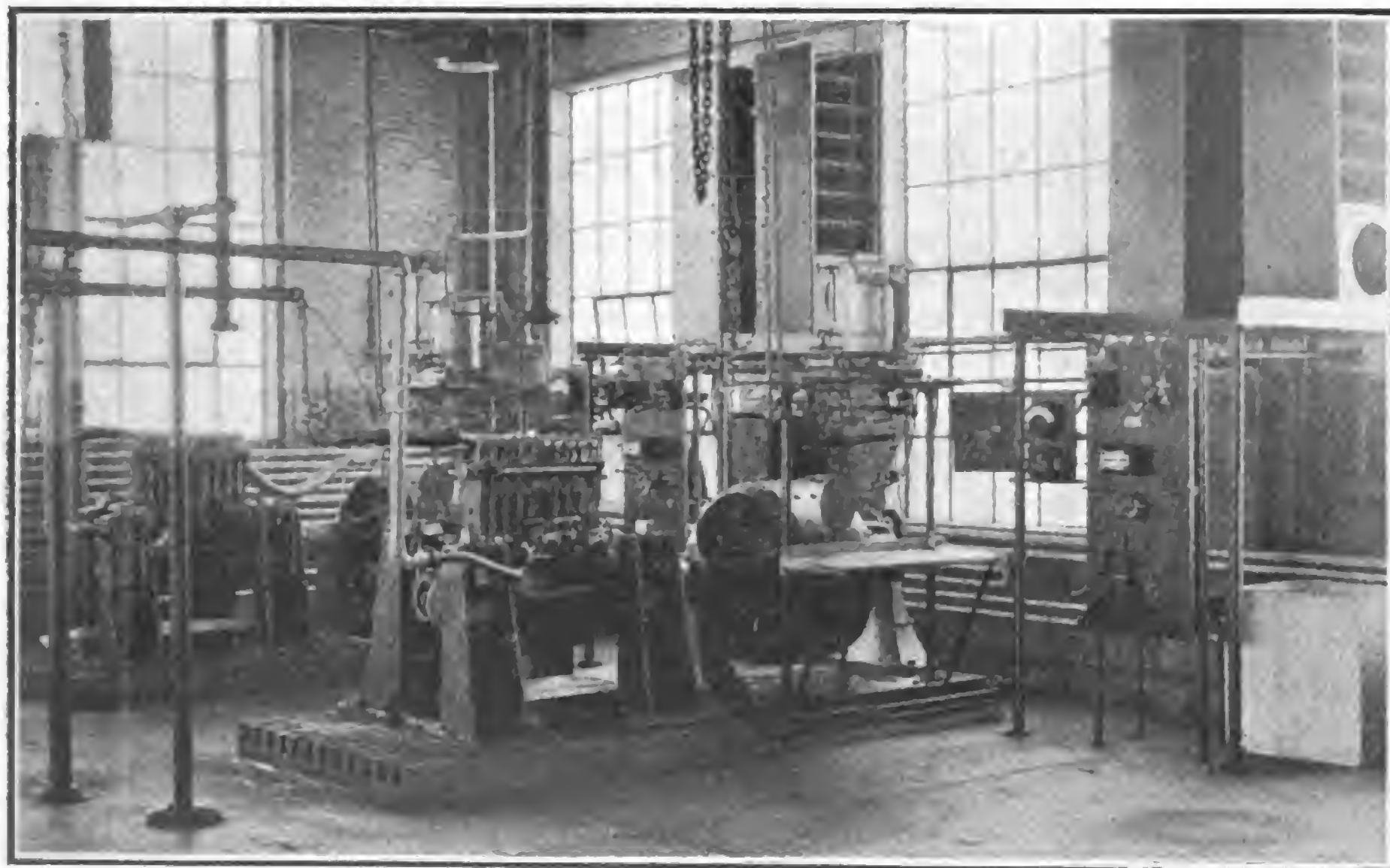
J. A. Blodgett, southern distributor of Gary trucks, and a director of the company, is removing his headquarters from Shreveport, La., to New Orleans.

Herbert F. Krueger, formerly a truck dealer in Milwaukee, has been appointed a sales representative for the Gary Motor Truck Co.

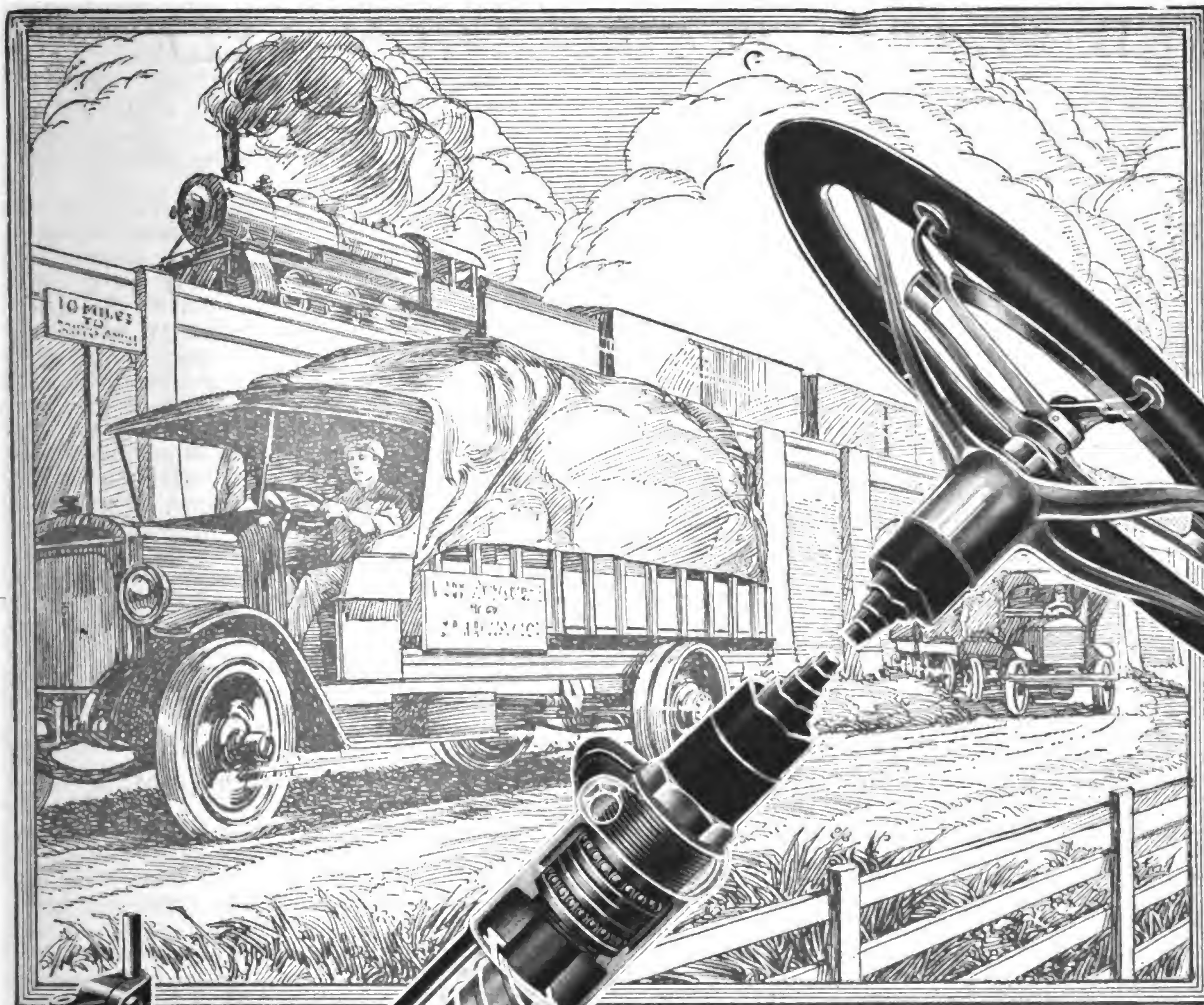
N. L. Le Blond has been named to represent the Gary Motor Truck Co. in the Middle West. He was formerly division manager for a well known truck manufacturing concern and was at one time a wagon manufacturer.

REOS IN OKLAHOMA.

A. C. McGeehon has taken over the distribution of Reo cars and trucks at Walters, Okla.



Making Dynamometer Tests at Midwest Factory of Heavy Duty Tractor and Truck Engines.



Better Transportation -The Nation's Vital Need

With rail facilities taxed to the breaking point, our biggest problem today is to relieve this strain and help transportation keep pace with industry and agriculture. Unquestionably the solution is the motor truck. Its worth has already been established, and the necessity for its use on a larger scale is becoming more and more apparent every day.

Ross Steering Gears have played an important part in making the motor truck a more efficient and reliable means of transportation. The easy steering, safety and reliability, which are guaranteed by the exclusive screw and nut design, have made Ross Steering Gears standard equipment on 418 different motor truck models from 165 different manufacturers.

Write for any further information desired

ROSS GEAR & TOOL COMPANY

790 Heath Street, Lafayette, Ind., U. S. A.



ROSS STEERING GEARS

THE STEERING GEARS THAT PREDOMINATE ON MOTOR TRUCKS

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

NEW CLARK SPEED WAGON AXLE

A new speed wagon axle, measuring up in all particulars of materials, care in manufacture and rigid inspection with the various internal gear axles similarly produced and used as standard driving units on such a large number of leading trucks, has been put in production by the Clark Equipment Co., Buchanan, Mich., which manufactures a complete line of motor truck axles.

Its newest product is especially designed for commercial car work. A bevel gear is used because it has proven popular for light, speedy work. This model axle is intended for use only on trucks of one ton or less.

In this new Clark axle are incorporated the ruggedness and strength characteristic of the heavier type of Clark axles. This axle is a fixed type bevel gear construction with a pressed steel load carrying member or housing designed specially for truck service. The differential is a standard type supported in a carrier and can be removed from

either the front or rear of axle. This construction is very desirable in a bevel gear truck axle due to the increased bearing load where stresses are set up on a small pitch diameter pinion. The differential is mounted on ball bearings and the radial and thrust loads are taken on radax ball bearings. The differential is very easily adjusted by removing the cover plate located on the back of the load carrying housing, and by removing the adjusting nut in the direction desired, or by moving the third member cage either up or down.

The wheel bearings are of the straight roller type and are designed to take the thrust in both directions. The bearings are so mounted that the thrust on each wheel is taken care of independently by each bearing rather than transmitting the thrust in the direction of the wheel bearing on the opposite side, which has been the general practise on passenger car axle construction. Taking the thrust in both directions on one wheel bearing

eliminates the possible wobble and wheel looseness so noticeable in axles with bearings that take the thrust in only one direction.

The hub is mounted on a six-splined shaft; the drive being taken through this splined shaft, and is so designed that the hub may be drawn up by tightly clamping inner race of wheel bearing.

Brakes are internal, 2½ inches wide, of special design using four shoes to each wheel. The brake and its operating mechanism are designed to give great braking capacity with long life. The brake parts are bushed with oilless bearings, and are easily replaced when worn. This axle is designed to carry 3000 pounds on the spring pads, and to handle 1600 inch pound torque motor. The standard gear reduction that can be furnished on this model is 5.9 to 1 or 6.2 to 1. The 6.2 to 1 reduction is furnished with spiral bevel gears. The weight of the axle is approximately 360 pounds complete with hub parts.

YELLOW CAB TRUCKS

John Hertz, president of the Yellow Cab Manufacturing Co., Chicago, announces that this widely known firm, which has been turning out about 2000 of its famous cabs a year, is immediately to invade the passenger car and truck manufacturing field. To carry on its enlarged programme the organization has a magnificent new factory at Menard and Dickens streets. Several millions of dollars will be invested in the expanded enterprise and hundreds of additional workers will be employed.

The company will operate on a mammoth scale, going into heavy production almost at once. Two types of light trucks will be put on the market. One will be a one-ton speed wagon model and the other a ton and a quarter speed truck. The line of cars will be headed by the Ambassador, a 12-cylinder model.

It will be made in all the various styles. A four-cylinder car of moderate price will be manufactured in quantity and in all the leading types.

In commenting on his plans President Hertz says: "In planning these new cars we forgot entirely the element of price and remembered only one thing, an ideal. We decided to build automobiles and trucks which would live more than one season, more than two, more than three or four, and still remain good, serviceable outfits."

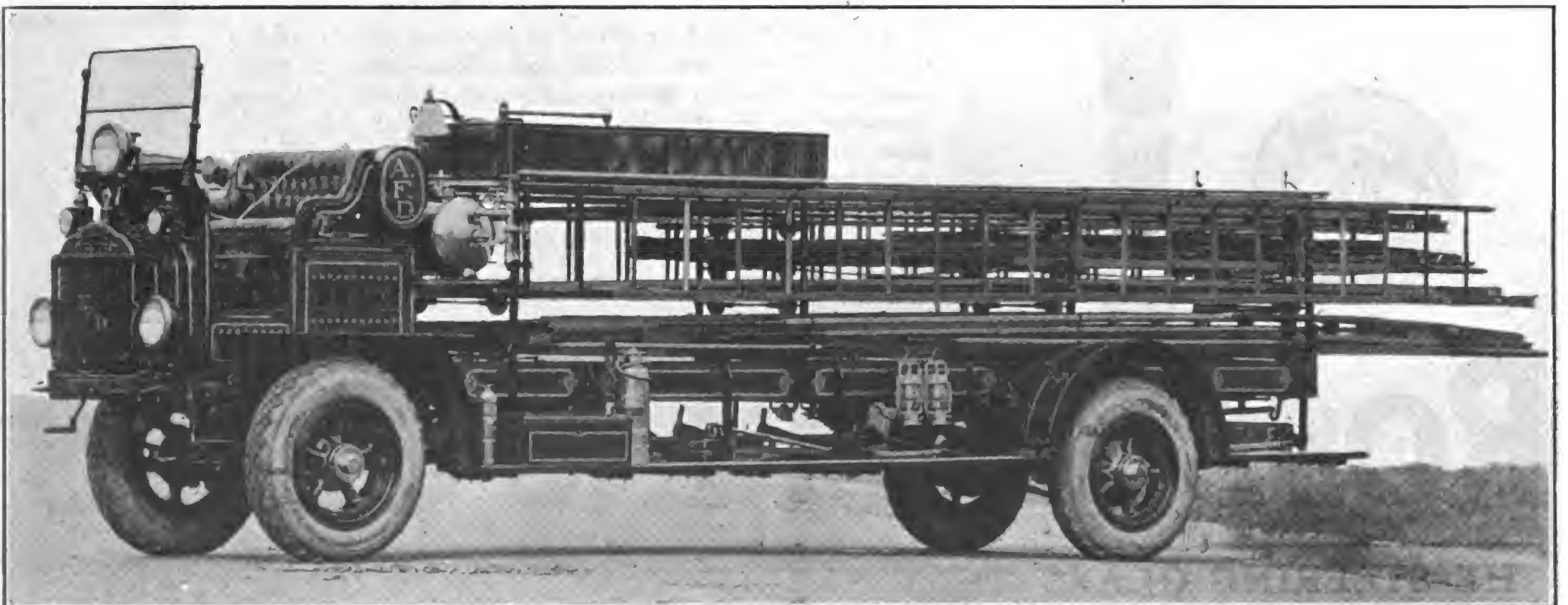
CLYDESDALE DEALERS MEET.

Optimism abounded at the quarterly meeting of Clydesdale distributors at the factory plant, Clyde, O., late last month. More than 50 distributors from leading points in this country and Canada were present.

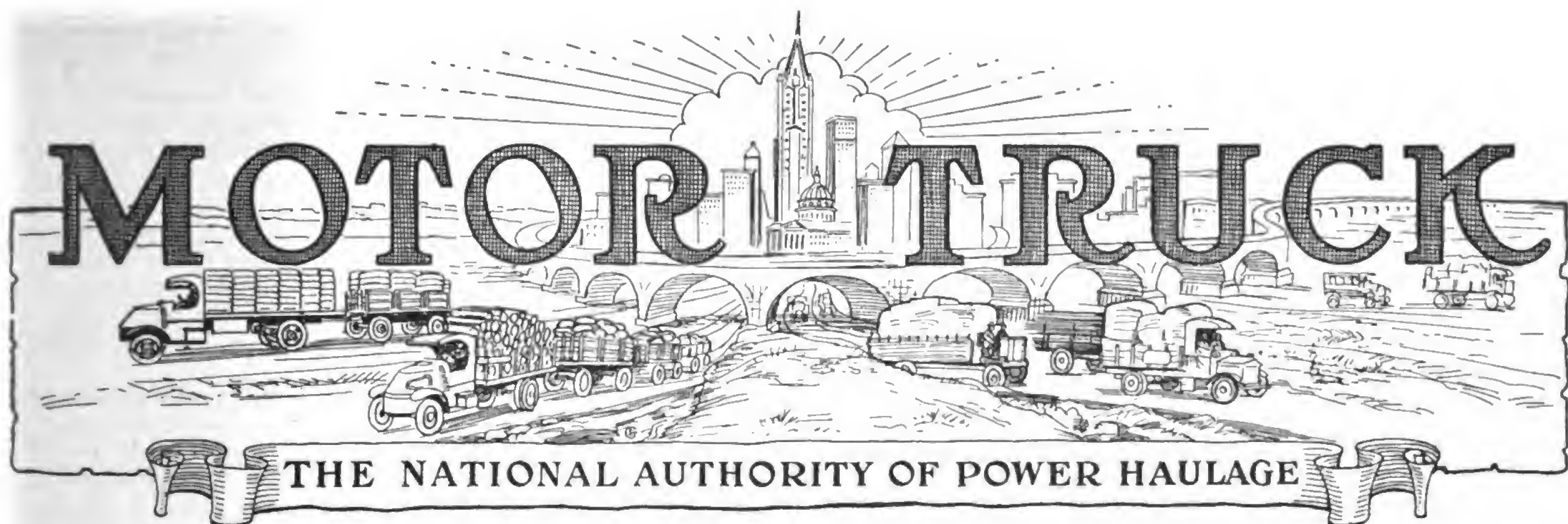
FWD FIRE TRUCK

The city of Ashland, Wis., has just put into service a new 216-inch wheelbase hook and ladder fire truck, with a 40-gallon chemical tank. This fire fighting equipment is mounted on a three-ton FWD chassis. Power is furnished by an unusually powerful type J Wisconsin motor of 5.1-inch bore and 5½-inch stroke. The truck is run at an average speed of 25 miles per hour and has an excess power available for maintaining this speed under poor road and grade conditions.

The manufacturer claims that the four-wheel drive principle of the FWD, which gives pulling power to all four wheels, enables the vehicle to travel soft and muddy roads, as well as to overcome the heavy snow drifts of winter, these attributes being especially desirable in fire fighting equipment.



Fire Truck Mounted on Three-Ton FWD Chassis, Which Ploughs Through Snow and Muddy Roads with Equal Facility.



VOL. XII. NO. 2.

PAWTUCKET, R. I.

FEBRUARY, 1921.

POWER VEHICLE SUPREME FOR LIMITED HAULS

Statements by Truck Owners Show Savings in Money, Time and Labor—Actual Facts and Figures in Operating Experiences Cited to Demonstrate That Motor Carriers Are Most Efficient and Economical Handlers of Freight in Shipments up to 50 Miles—No Line of Business Excepted.

Manufacturers and owners are rallying behind the campaign launched by the MOTOR TRUCK in the January issue to demonstrate beyond quibbling the superiority of the power hauler for freight shipments up to 50 miles all the time and for hauls up to 100 miles most of the time.

Last month this magazine gave concrete examples of concerns in many lines which have saved money,

time and labor through motor truck delivery. Because of the exceptional interest shown another series of economical experiences are here cited. To convince those who might feel that the manufacturer is directly interested, and might be prone to exaggerate, several truck owners tell their own story of what the motor truck has achieved for them along efficiency and economy lines.

Saves \$46 a Day on Each of Nine Trucks

(By T. B. GATCH, T. B. Gatch & Sons, Belair Road, Roesesburg, Baltimore, Md.)

“WE HAVE standardized on Service trucks and never want any other kind working for us.

“We are stone quarry operators and have been working in this same place for over 80 years. Our family has been in possession of this property since 1717, and in the cemetery up yonder seven generations of Gatch’s are buried.

“When I was a young man I had a pretty hard time until I came back here to the stone quarry and went into business with my father. I had nine sons of my own and I figured that the only way to keep them in business with me was to keep them interested. So I tried to build up a business which would give them an opportunity to display all their ability, no matter in what direction it might run. Every one of my sons is now in business with me and to make sure of their staying I have built each one a

house nearby as soon as he decided to get married.

Trucks Average 60 Miles a Day.

“Although this stone quarry has been producing steadily for 80 years, apparently it is good for many generations to come. We blast the stone out, run it through our crushers, and then sort it into sizes running all the way from dust to three inches. This stone is used mostly for road building.

“For hauling this stone we are using nine 3½-ton trucks. All have dump bodies and mechanical hoists. They are loaded from our overhead storage bins by a chute in a few minutes, and at the other end they are discharged by means of a dump body. In this way we keep the trucks running nearly all the time, so that they average 60 miles a day.

“Since there is very little road building during the winter, we ordinarily do

not run the trucks for about two months. In that time they receive a thorough overhaul. During the winter of 1918-19, however, the trucks were working for the government, hauling stone for road and construction work.

Working on Bad Roads.

“At times we have had three sets of drivers on these trucks, and run them 24 hours a day. Ordinarily eight of the trucks are making regular trips. We keep the other one at miscellaneous work, such as filling rush orders.

“As a rule the trucks are not running through any traffic, but they have to climb a good many hills, and the roads they must travel are in the worst condition imaginable. Naturally, most of the road building is being done where the roads are the worst, so that our trucks are continually working under the most unfavorable conditions.

"Every day we make out a card for each truck, showing the truck number, driver, destination of the load, number of gallons of gasoline, gallons of oil, pounds of grease, tons, trips, miles and the total hours operated. From these records we have learned that our Service trucks are averaging 3.1 miles per gallon of gasoline, and 85 miles per gallon of oil. Their average load is 5.27 tons and they average five trips a day, making one stop to the trip.

Minimum Repair Cost.

"Believing that one of the greatest factors in low operating costs is the ability to keep repairs down to the minimum, we have established our own machine shop. Here we make practically all necessary repairs to all our other machinery as well as to our trucks. In this shop we have two lathes, one of which is large enough to handle the shaft of a crusher; a power shovel, a 40-ton tire press and a number of other machines.

"We have our own patterns and cast all our own bearings and other parts. We have one mechanic whose time, when divided among the nine trucks, amounts to \$173.33 a year for each truck. For repair parts we find that our trucks cost on an average of \$47 for the first year and increase at the rate of about 10 per cent. a year up to the end of the eighth year, when we figure that their useful life is over. On account of the high mileage, repairs amount to only 1.73 cents a mile, an unusually low figure.

"Although we do load our trucks rather heavily, we are very careful about overspeeding. Any one of our drivers caught going over 15 miles an hour is immediately discharged; and we have found it necessary to dismiss two of them this year. By having our chauffeurs report troubles to the mechanic every night we anticipate troubles and remedy them before they become serious. Besides the repair man inspects each truck every night.

The Operating Cost.

"In figuring operating costs we allow \$86.67 a year per truck for administrative overhead. This is the value of the time required to weigh the load and dispatch the truck. Our garage amounts to only about \$30 a year per truck, be-

WHAT RECORDS SHOW.

AVERAGE COST.

Cost per day (including driver)	\$18.08
Cost per mile.....	.3013
Total cost for period...	\$12,530.13

OPERATION.

Days operated.....	693
Miles traveled	41,580
Miles per day.....	60
Miles per gallon of gas	3.1
Miles per gallon of oil..	85.0

ITEMIZED COST.

Driver cost per day (included above).....	\$4 67
Depreciation per mile...	.0363
Maintenance and repair, actual, total.....	\$679.72
Maintenance and repair, actual, per mile.....	.0164
Maintenance and repair, estimated, per mile...	.0173
Tire cost, estimated, per mile .....	.0377

cause we use some cheaply constructed sheds which are not heated.

"One of our trucks is now 4½ years old and is still in very good condition. With the excellent care we give the trucks we believe they will run at least eight years, giving us a minimum life of 120,000 miles. Our drivers are paid \$28 a week, but they get nothing on the days when their truck is laid up, or when they do not work.

"The records of the truck given here, figured on the National Standard Cost System, show that this truck costs \$18.08 a day, 30.13 cents per mile, 68.61 cents per ton and 11.44 cents per ton-mile. This remarkably low operating cost is due to the fact that the Service is a good truck and that we know how to maintain it and operate it.

"This truck was chosen as representative of our fleet of nine. Some of the trucks will not do quite this well, and others will do considerably better; but this truck probably comes very close to the average performance of our nine trucks.

Horses Costlier Than Trucks.

"Before purchasing these trucks we used horses and mules, and at one time

had 45 head. When competitors started to use motor trucks, we soon found out that our horses couldn't compete with them, and that was what started us using trucks.

"One of our trucks is easily doing the work formerly done by four teams. They cost \$16 a day apiece, or a total of \$64. The truck is doing the same work at a cost of only \$18.08, or a saving of \$46 per truck per day.

"With the horses it was impossible to deliver stone at a greater distance than 10 miles, and it was difficult to deliver that far. Now that we have the trucks we think nothing of going 30 miles and getting back the same day. Because of our increased range our business has increased three fold. In addition we have a larger list of satisfied customers, because we can give them the quick service they need to keep their men busy.

"During the winter months, if we have to operate in winter, the advantage in favor of the trucks is even greater than during the good weather. We always had a great deal of trouble with horses slipping and falling on the snow and ice; with the trucks we have very little trouble, though we seldom use chains.

"The Service trucks have given us great satisfaction, and have proved much better in every respect than the other three kinds of trucks we have tried. We get more miles to the gallon of gasoline, lower repair costs, better service and greater dependability. That is why we now have a fleet of nine Service trucks, and can truthfully say that we never expect to operate any other kind of truck."

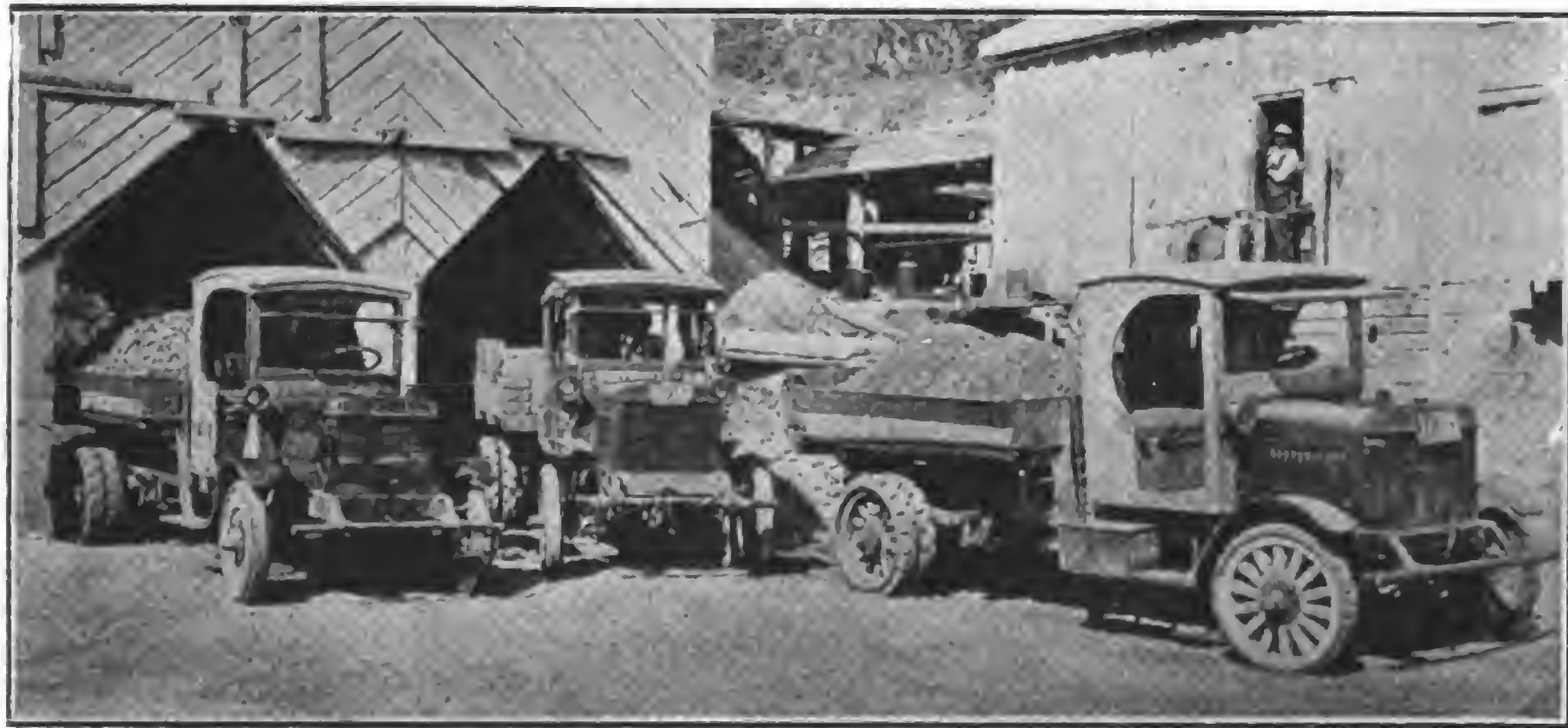
TO CUT DISTRIBUTION COSTS.

Reduction of distribution costs and the working out of improved methods of distribution will be two of the most important aims of the new Department of Domestic Distribution of the Chamber of Commerce of the United States, which has just begun to function. "More practical and sensible methods by which we as a nation could distribute our products, and help to bring about a reduction of the price of commodities," according to Alvin E. Dodd, manager of the new department, formerly director of the Retail Research Association of New York.

132,524 TRUCKS IN NEW YORK.

B. F. Goodrich Rubber Co. figures show that New York state has a motor-truck and omnibus registration for 1920 of 132,524. Ohio had 83,300. In the first four weeks of 1921 Ohio registered 75,000 trucks, 90 per cent. of the 1920 total. This rush is due to the fact that the mild winter has allowed trucks to be operated continuously.

The Winchester & Western Railway Co. in West Virginia is to use powerful motor trucks, equipped with flanged wheels, instead of steam locomotives. Passenger and freight trains will be shorter, but there will be more of them, thereby providing better service.



Some of the Service Trucks Operated by T. B. Gatch, Each of Which Saves Owner \$46 a Day Over Horse-Drawn Hauling.

TRUCKS DOUBLE BUSINESS FOR BIG CHICAGO FIRM

(By JOSEPH F. MEYER, President Federal Fireproof Storage Co., Chicago, Ill.)

WE CONSIDER eight years of constant service and 150,000 mileage record a big credit to a motor truck. That is briefly the history of our Selden truck. It is still in service, each day doing its full share, and asking no consideration of old age.

We have no set route for the truck, but because of its speed we use it for any work within a radius of 40 miles—the round trip of 80 miles is easily made in a day. On an average the Selden will cover 60 miles daily, making 15 and 20 pick-ups or deliveries.

This wide business range would not be possible with horses. A few years ago we replaced seven of our 10 teams with six motor trucks, and as a result of this change the amount of our business was doubled.

The cost of operating our Selden one-ton truck is remarkably low in spite of its age; especially when we consider that it has been really doing the work of a 1½-ton truck. The repair bills are very small, the truck is seldom laid off for repairs. For four or five months at a time it has been in continuous service without the loss of a single day.

Overhauled Annually.

Once a year each truck is carefully overhauled in our shop, and all worn parts are replaced. For the last four years this overhauling has amounted to approximately \$150 yearly in each case.

At the present we are getting about eight miles to each gallon of gasoline. Of course, when the truck was new, we secured 50 per cent. more mileage from each gallon, mostly due to the higher quality of gasoline at that time, but we are very well satisfied with the results we are now obtaining.

In figuring depreciation and interest on the investment, we have based our figures on a life of eight years and a total mileage of 150,000. The truck has lasted longer than the manufac-

THE COST RECORD.

Total Period.		1 Year
Period covered.....		294
Days operated.....		18,224
Miles traveled.....		2,278
Gasoline—Gallons used.....		588
Cylinder oil—pints used.....		
Daily Averages.		
Miles traveled		62
Miles per gallon gasoline.....		8
Miles per pint oil.....		31
Investments.		
Total investment.....	\$2,300.00	
Tire value	215.00	
Total less tires—to be depreciated		2,085.00
Fixed Charges—Yearly.		
Interest on total investment at 6%	\$77.63	
Taxes and licenses.....	52.50	
Insurance	200.00	
Garage expense	200.00	
Administrative overhead.....	200.00	
Total per annum.....	830.00	
Total per month.....	69.18	
Variable Charges—Period.		
Fuel at 23c gallon.....	\$523.94	
Cylinder oil at 7½c pint.....	44.10	
Tires—18,224 miles	280.64	
\$215—14,000 miles life.		
Depreciation—8,224 miles.....	253.31	
\$2,085.00—150,000 miles life		
Maintenance and repairs (est.)..	300.00	
Drivers' wages	1,716.00	
Total variable charges.....	\$3,117.99	
Total fixed charges.....	830.13	
Total operation cost.....	\$3,948.12	
Daily Costs.		
Cost per day operated.....	\$13.42	
Cost per mile traveled.....	.22	
Repair cost per mile—est.....	.013	

turers claimed, and seems good for thousands of miles more service. Our Selden has been a steady money

earner, having increased our business range, a growth which would have been impossible without the use of motor trucks.

PIONEER TO BUILD.

The Pioneer Truck Co., Chicago, Ill., knows nothing about a supposed depression in the industry. This organization is going ahead with plans for a half million dollar plant at Valparaiso, Ind.

Yet New York Plans to "Tax Heavy Trucks "Off the Roads"

A strong effort will be made by the New York Legislature to "tax heavy motor trucks off the roads" of the state, according to legislators who are engaged in drafting motor car legislation to meet recommendations embodied in Governor Miller's annual message.

Annual fees of \$500 are being proposed for trucks of five tons carrying capacity, of \$600 for six-ton trucks, of \$700 for seven-ton trucks and of \$800 for eight-ton trucks. Trucks of less than five tons would be permitted to operate for from \$50 to \$90 a year.

"The high tax on motor trucks," said Senator Seymour Lowman of Chemung, chairman of the Senate Committee on Internal Affairs, "is being proposed with the deliberate purpose of putting an end to the use of super-motor trucks on our roads. We cannot drive them off the roads, but we propose to tax them off."

Senator Charles J. Hewitt of Cayuga, head of the Senate Finance Committee, will sponsor the measure embodying Governor Miller's recommendation for motor car taxes, with an annual aggregate of \$10,000,000, to be used for highway construction and maintenance.



Three Views of Selden Truck, Which Has Hauled Freight 150,000 Miles in Eight Years for Federal Fireproof Storage Co., Chicago, Ill.

Sheep Herder Saves \$150 Monthly With One Truck

Peculiar demands are made on trucks operating in the sheep business. Because of the rough roads encountered and other conditions in this field claims have been made for the superior utility and economy of the horse and wagon. D. F. Mackay, who operates an Oldsmobile truck at Granger, Wyo., knows different and his findings are based on actual experience.

Here's his story:

"The sheep business is a business that is in a class by itself. A truck that is satisfactory in the store, freight or general delivery business may fall short of meeting the demands of the sheep business. There are many reasons why. I will name some of them. The car must be dependable, as we are almost always a long distance from a garage; second, the car must have power and plenty of it, for we always expect to deliver right to the sheep camp, often several miles from any road, and usually on the highest hill, and we have mud, snow, deep washes, creeks, brush, etc., to go through on every trip; third, it must be a good traveler, because when not hauling we can use it as a roadster for making trips on business to towns or from camp to camp, whereas a slow, heavy truck would be too rough riding and cost too much to operate.

"The conditions prevailing in Wyoming call for a truck that has extreme high clearance, pneumatic tires, a very strong chassis and a powerful motor, but yet the motor must not be too big. The Oldsmobile combines all of these essentials. When I say the motor must be small but powerful, I mean that it must be capable of hauling the loaded truck to any desired place; but as the greater part of the run is made on a fairly good road before taking to the brush, a heavy motor would waste gas and oil. I make all trips, going any place without hesitating, just the same as if I had a team and wagon, but I can easily haul as much as a team and cover the ground three times as quickly.

"I have had 10 years experience driving all makes of cars and think I can judge a car pretty well as to quality and adaptability to certain conditions. I knew what I wanted when I came to see the Oldsmobile truck and went over it very carefully, and made up my mind it would be far better for our particular use than any truck I could get. I bought one. I will say right here it has done better than I expected, which is saying a lot. Maybe you would like to know how we make it pay—if it is really economical to run. This is what I did with it last spring. During the lambing season, about 32 days, I ran 2800 miles, making hauls from and to seven different camps. The camps were some distance apart, the first being about 20 miles from Evanston, and the last about 56 miles. It hauls all the hay, oats, coal, oil, groceries used by 28 men and 30 horses, and I had all the time necessary to direct the work and keep everything lined up properly, the last being the most important part of my work. I could be anywhere at almost a moment's notice.

"I will give you an estimate of the cost of team and by motor truck of the work I did last spring. This is figures on my outfit—my father, Dan Mackay, Sr., runs the other outfit and has his own truck:

COST OF WAGON OUTFITS.	
Two good teams cost.....	\$800.00
Two sets of harness.....	250.00
Two three-inch wagons....	425.00
Cost of running—	
Two men, 30 days.....	\$250
Two teams, hay and grain	75
Two teams in livery stable every other night at \$3.....	90
Two men in hotels 15 nights, each \$3.....	90
	505.00
Total.....	\$1,980.00
COST OF TRUCK.	
Cost of Oldsmobile truck.....	\$1,175.00
Cost of running—	
370 gallons gas at 35c....	108.50
7½ gallons oil at \$1.....	7.50

One fan belt.....	1.25
Five nights' storage.....	3.75
Five nights in hotel at \$3	15.00
Total.....	\$1,711.00
TOTAL.	
Wagon cost.....	\$1,980.00
Truck	1,711.00
Savings.....	\$269.00

"This is first cost of outfits. The monthly running cost would be for lambing season: Wagons, \$505; truck, \$136. After lambing, one wagon could be eliminated, making the wagon cost \$252.50; the truck probably would cost \$100 if it did absolutely all of the work. You see it would save \$152.50 per month, thereby saving enough to buy another truck each year. The Oldsmobile is not likely to wear out for several years, however, judging from its present condition. As a usual thing I do not haul a very heavy load. The idea is to haul everything quickly that is needed, whether large or small. My car will out-pull, out-climb, out-speed any truck on this part of the range. Ask any man who knows me and he will say I do anything I want to do with the Oldsmobile truck."

LAW DOES NOT HIT TRAILERS.

The attorney general of Maryland holds that the weight limit of 10 tons in the Maryland law applies only to one vehicle and that portion of the load that it actually carries or supports on its own wheels. Thus the wheels of a semi-trailer may carry additional weight provided the weight does not exceed the further restriction of the law to 650 pounds per inch width of tire on any wheel.

The Southern Motor Manufacturing Association, Ltd., Houston, Tex., announces an increase in the price of its two-ton truck from \$2575 to \$2875. The increase became effective Feb. 1. The name of this model "C" has been changed to model "TK-20-2."



Sheep Ranch Scene, Showing Oldsmobile Truck Which Ran 2800 Miles in 32 Days Over Hill and Dale for Wyoming Man.

Sell Transportation Tomorrow on Good Will Built Today

The two leading authorities, Comptroller of the Currency Williams and Governor Harding of the Federal Reserve Board, are in accord as to the present economic soundness of the nation. It is recognized that stabilization could come only through a day of depression. Men of vision and close observers of conditions declare readjustment to be in the home stretch.

The early spring is fixed by business forecasters for industry and commerce to regain their normal stride. To gather full speed by that date there must be a gradual movement forward in all lines from now on. The manufacturer, the wholesaler and the retailer are already feeling the nibbles which mean that the buyer is in the mood for early action. The well managed house is making ready to put its product where the buyer cannot evade it.

In the impending return of pre-war trading the truck industry will share fully. Its place in the transportation trinity is unchallenged. Yet it can remain on safe ground only by a continuation of the policy of selling transportation, rather than the individual unit. The stressing of the value of the motor truck in teaming up with the railways and the waterways in the national transportation scheme, thereby cutting time and the distribution costs, is more vital than ever. The work of educating the public to motor power utility, efficiency and economy cannot be carried on too extensively. The field for the truck is unlimited and only by recognizing that there is an unending market to be exploited can the industry come into its own.

In the lull before business is itself again the distributor and dealer can serve the cause by standing behind the manufacturer in building good will. The good will established with the general public and the individual prospect today is capital stored away to be realized on tomorrow. When buying begins every ounce of good will engendered now will count in piling up business totals.

Now is the time for tests and tryouts that the unworthy may be eliminated and only tried men and policies be employed when the real work begins. Administrative, as well as mechanical, experiments should be made. The servicing branch should be placed at a notch where a guarantee to the owner will have the tautness of a bond. Each unit must be keyed up to the task in hand. When the race for business starts every institution in the field should be on the mark and ready to set sail full tilt for the goal.

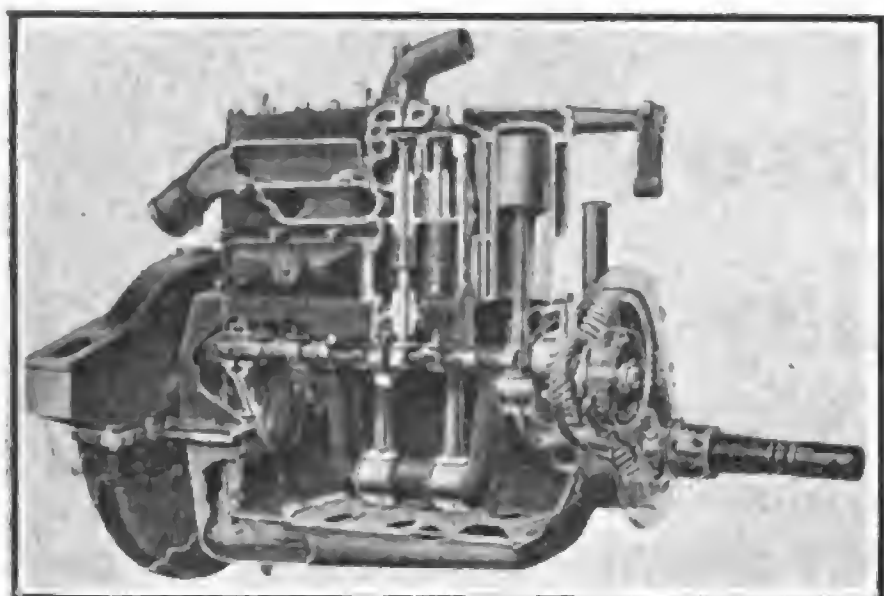
Meanwhile, there can be no lowering of standards in merchandise, methods or men. If material and labor costs fall prices will be cut, but the grade of the product cannot be sacrificed. The quality must be maintained at all hazards.

Methods employed in conducting the truck business must be revised upward, if at all. Ethics in accord with the tone of the profession need to be adopted and adhered to. National advertising must be lofty and dignified. The manufacturer would do well to recognize that transportation—not one make of truck—is the commodity in which he deals. Education might well be the keynote of every message to the public.

The men on the selling line must harmonize with the quality and importance of the product they merchandise. All who are engaged in marketing a truck directly represent the manufacturer and the latter is judged by his agent. Distributors should have financial and mental soundness. Dealers and salesmen must have integrity and training.

The manufacturer and distributor need to recognize that theirs is the duty of selling transportation. The small dealer or salesman, fearing lost time and striving for the quick commission on which depends his daily bread, will sell only the truck he represents. This is against theory, but is fact. The fate of the industry, therefore, rests with the maker and the wholesaler of trucks and the parts thereof. They must be faithful to their trust.

CYCLONE MODEL A 1½-TON TRUCK



Cyclone Truck Is Powered by Herschell-Spillman 35 Horsepower Motor.

The Cyclone Starter & Truck Co., Greenville, S. C., is in production with a new truck, a 1½-tonner, that has been especially designed for southern road conditions and usage.

The new truck, an assembled product, embodies many features which have been time tried in other parts of the country and have been found to stand up under hardest work.

Well known units are used throughout, of ample size for the work which the truck is to perform and the equipment of the truck is very complete, no article of equipment having been left off which would conduce to the comfort of the operator or to better working of the truck units.

Service Sold With Truck.

A policy which is followed by the Cyclone Starter & Truck Co. that is rather new in the truck selling field, is that of selling the customer a certain guaranteed service when the truck is bought. This feature while not especially new in the truck field in general, apparently is new to this section of the south and the company lays great stress upon its campaign along this line. Service stations have been established by the company through its agents in the principle cities and towns throughout the South and these stations, besides being well stocked with parts, are operated to see that customers owning Cyclone trucks receive

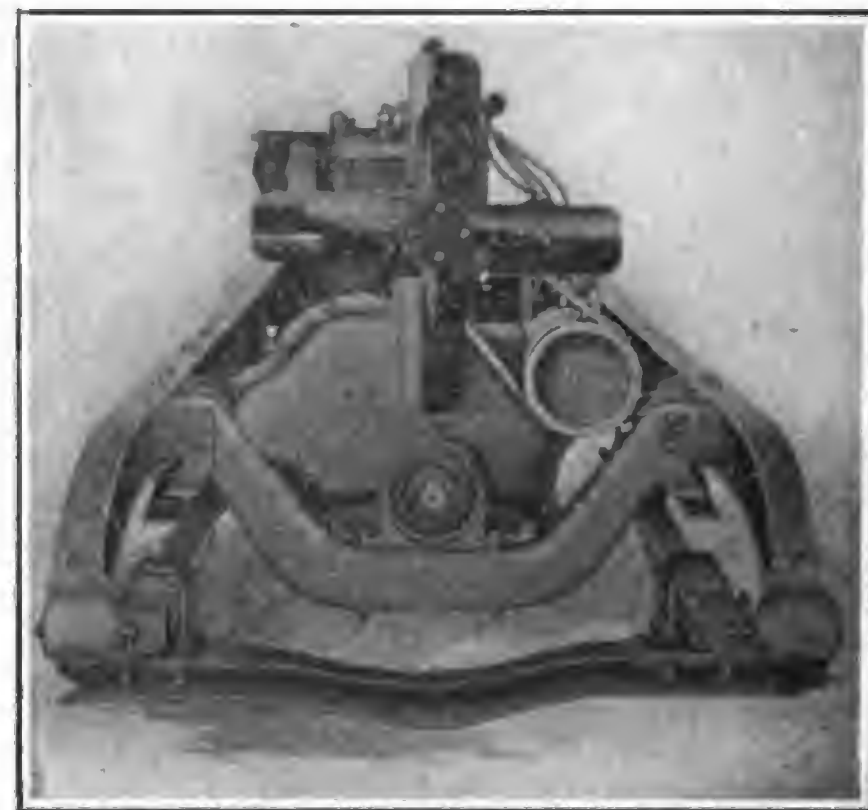
courteous treatment and prompt service at all times, besides being helped in every possible way to keep their trucks in good running condition.

The Power Plant.

The Cyclone 3000-pound capacity model A truck is amply powered by a Herschell-Spillman, four-cylinder, four-cycle, L head type engine, of unit construction, with cylinders cast en bloc and integral with upper half of crankcase. The valve mechanism is fully enclosed by removable side plates and lubricated by an oil mist from the splash of the connecting rods in the crankcase. The bore is 3½ inches and the stroke five inches, developing, it is claimed, 35 horsepower at 1800 revolutions per minute.

The lower half of the crankcase is separable, as is also the head of the cylinders. The lower half contains the oil reservoir and an upper pan, having depressions or troughs, holds oil into which the tips of the connecting rods dip, supplying oil to the interior parts of the engine. The oil pump is driven from a helical cut gear on the rear end of camshaft, is fastened to the upper half of crankcase. The pump, being immersed in the oil in the reservoir, is always primed. Oil is forced by the pump to the main bearing of the crankshaft and camshaft and to the timing gear case supplying lubricant for the train of timing gears in front crankcase extension. This is the well known force and splash feed principle that has been used in many types of engines for several years and has proven highly successful.

Cooling the engine is accomplished by the thermo-syphon method, an extra large radiator being fitted to the chassis frame and connected to the water intake and outlet of the engine by large rubber hose connections. Large water spaces are provided in the water jackets of the engine to facilitate cooling and attention has been given to proper cooling around the valves by providing a wide jacket at these points.



Brackets Hot Riveted to Cross Member of Frame Support Radiator, Greatly Reducing Torsional Strains and Preventing Radiator Leaks.

Westinghouse starting, lighting and ignition equipment are used with this engine and performs satisfactorily under all conditions.

The carburetor is a Schebler, meeting conditions admirably and supplying the engine with sufficient gas for all speed and power requirements.

The steering gear is the Ross irreversible type, connected through heavy linkage to the ball joints and tie rod to the wheel spindles and is easily adjusted to take up play and looseness through wear.

The transmission gearset is a Warner selective type, having three speeds forward and one reverse. Gears are made of drop forged, heat treated steel, having large wide faces.

The clutch is a multiple, dry disc type, easy in operation. The frame is very flexible, made of pressed steel, 4 9/16 inch channels and braced with sufficient cross members of pressed steel. Length of frame 203 inches.

Springs are semi-elliptic front and rear, made of silicate-manganese, heat treated steel of extra length to insure maximum strength.

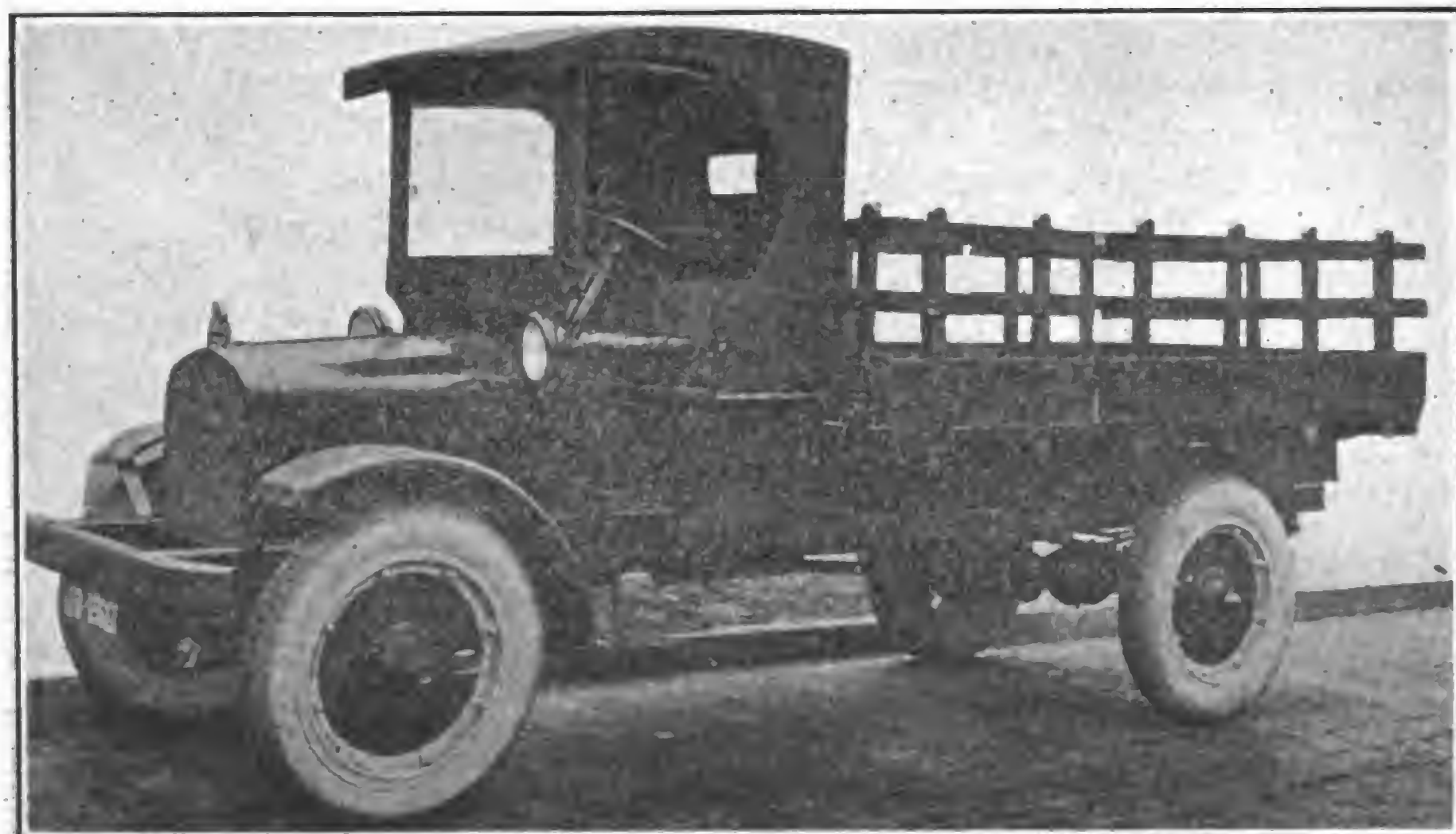
Alemite Lubrication.

Wheelbase 136 inches, with ample road clearance and the tread is standard gauge, 56 inches. All slow moving bearings, such as spring shackle bolts, steering spindle bolts, etc., are fitted with the Alemite lubricating system, which insures a sufficient supply of lubricant at the bearings.

The chassis weighs 3200 pounds with a body allowance of 900 pounds. Finished in black truck enamel with red wheels.

Equipment included with the chassis are spare rim, pump, electric horn, full set tools, heavy duty jack, tire repair kit, bumper and full set of fenders front and rear, running boards, cab fitted with weather proof curtains, ammeter and Alemite pressure feed compressor.

Already there has sprung up a strong demand for this product and the installations made to date have fulfilled all requirements and met every claim of the maker.



Cyclone 1½-Ton Truck Designed for Southern Traffic, Which Is Said to Revel in Rough Going.

"BUDDIE", NEW SPEED TRUCK ENGINE

THE Buda Co., Harvey, Ill., exhibited at the Chicago show a new truck engine known as model "MU," which was designed especially for the so-called light speed trucks of $\frac{3}{4}$ to one-ton capacity. This engine is the latest product of the Buda company's engineering staff and has been nicknamed "Buddie," a name by which it will probably be better known eventually than by its technical term "MU."

The Buda "Buddie" meets the need for a sturdy, dependable and highly efficient power plant for light jobs for city or country hauling, and is claimed to have a reserve power that will make it especially desirable for work in rural communities where roads are not as good as they might be.

The ease with which parts can be removed for inspection, repair or service is claimed to be the dominant feature of the Buda design. In the hands of the average layman or repair man parts subject to wear can be easily replaced without fear of complication.

The Buda company further recognizes that "Buddie" has laurels to retain in the industry and has designed this engine to carry on the high standards of Buda performance.

The cylinder head is detachable and extends over the edge of the cylinder block. It is furnished with a centrifugal water pump, but can be furnished with the thermo syphon cooling system if desired.

Suspension is three point, piston displacement 211.6 square inches, bore $3\frac{1}{2}$ by stroke $5\frac{1}{2}$ inches, developing under the S. A. E. rating 21.8 horsepower at 1000 revolutions per minute. The block test horsepower of this engine is not at present available, but it is understood to show an increase of over 30 per cent.

The same grades of material are used throughout in the construction of the new engine as are found in the models previously manufactured by this company. The same care has been taken in machining, grinding and fitting the parts, making the engine in every way the equal of the larger sizes, with the exception of dimensions.

Construction Units.

The cylinders are cast en bloc of grey iron, provided with ample water jacket space which is baffled so that the water is discharged directly beneath the valves and designed to secure complete circulation around each valve and cylinder. The removable cylinder head is secured by an ample number of alloy steel studs, so spaced as to secure uniform pressure on the copper asbestos gasket employed, and is provided with a large water space around and above the combustion chamber. Spark plugs are located in the head, the threaded part of the plug in contact with cylinder head being entirely surrounded by water. The water outlet on the cylinder head is fitted with a removable elbow, which may be placed in four different positions. A ledge is provided for the cylinder head which projects

over the block, this feature facilitating the removal of the head and suggests more frequent inspections and cleaning. Lugs are provided at each end of the head for breaking the joint and for the purpose of eliminating possible injury to the copper asbestos gasket.

The intake and exhaust manifolds are made of grey iron cast integral for the purpose of successfully handling low grade fuel. Choice may be had of either one of two types, one for use with gasoline as fuel and the other for the use of kerosene. The exhaust outlet is fitted with an expansion joint, the intake and exhaust manifolds being fitted to the engine on the valve side.

Typical Buda Crankcase.

The crankcase is typical of Buda design and is made in two sections, upper and lower, the upper section having the cylinders bolted to it by a suitable number of steel studs, while a web or bridge work cast in the casing supports the bearings of the crankshaft and camshaft, also the oil pump at the rear, which is driven by a helical cut gear from the end of camshaft. The upper section of the crankcase is extended forward, forming the timing gear case, and to the rear, forming the upper half of the flywheel housing.

The lower half is bolted to the upper half by steel bolts and is readily removable for cleaning, as the lower half of the flywheel housing is a separate casting, and is not disturbed when the pan is removed. Hand hole openings are provided in the bottom of the pan for draining the oil, removing the pump or screen. The covers are fastened by steel studs. The upper crankcase section is fitted with supporting arms cast integral at flywheel housing for fastening the engine

to the truck frame, while a bracket is cast integral with the timing gearset cover to which is bolted the cross member fastening the front end of engine to the truck frame, forming the three-point suspension.

The timing gearset cover is of the same material as the crankcase, is fastened by steel studs and readily removable in case of adjustment or renewal.

Reciprocating Units.

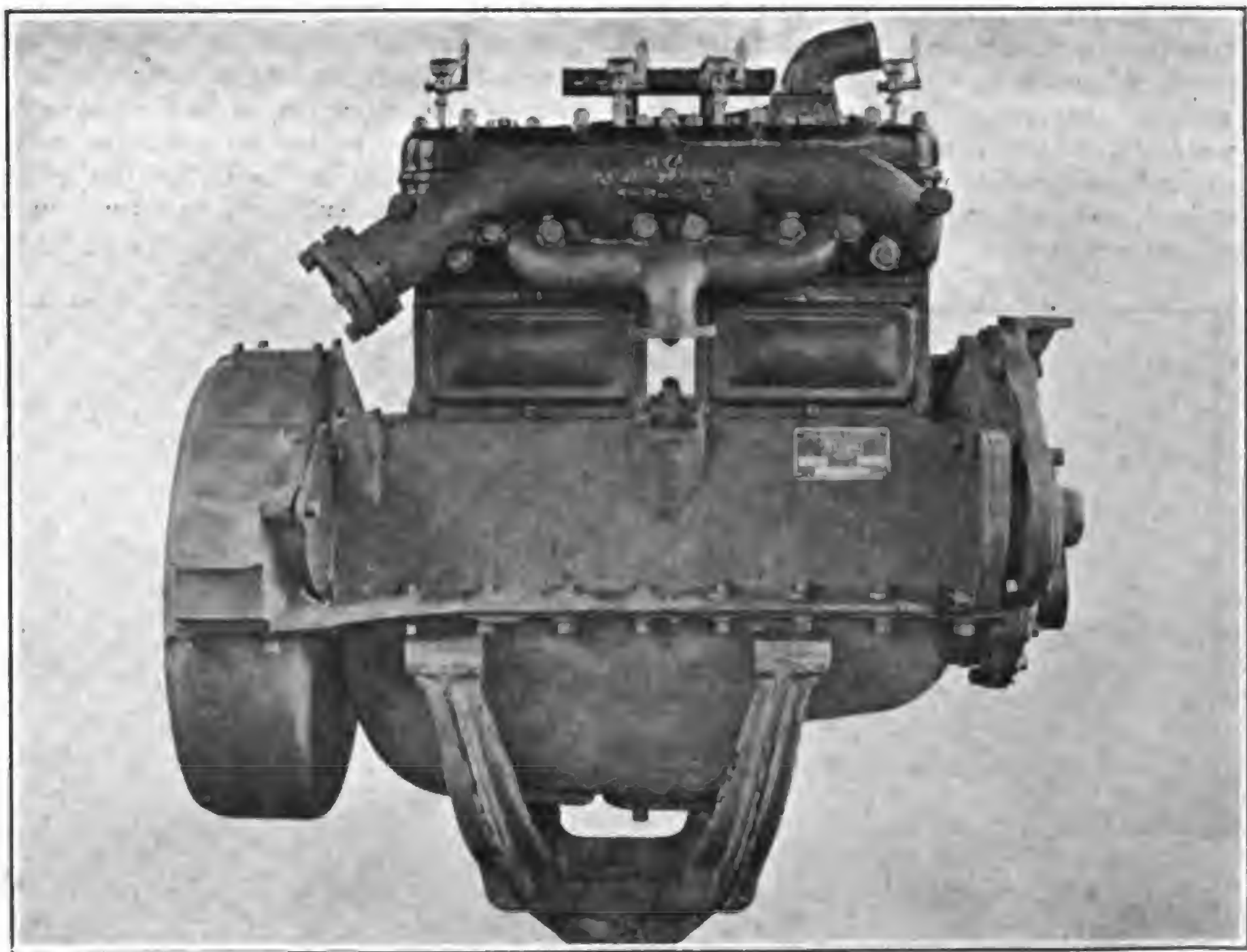
The crankshaft is of special design to admit of accurate running balance, is drop forged from open hearth steel, heat treated, machined and drilled for forced feed oiling system.

The three extra large main bearings and liberal connecting rod bearings are accurately ground to size. The rear end of the shaft is fitted with two oil throwers to prevent leakage and on the same end of the crankshaft, cast integral with it, is a flange to which the flywheel is bolted with steel bolts.

The camshaft and cams are drop forged in one piece with flange integral, to which the timing gear is bolted. The working surfaces of the cams and the three bearings, which are of liberal dimensions, are accurately ground to size. The cams are exceptionally wide and designed for quietness of operation.

The timing gears are extra wide of face and are cut helical in order to secure quietness in operation. The gear set is composed of five gears, one driving from the crankshaft, a second on the camshaft, third an idler, fourth a pump gear and the fifth for driving a generator. All gears run in a bath of oil supplied from the pressure system.

The valves and valve mechanism is enclosed by two plates at the side of the engine, easily removed for cleaning or



"Buddie" New Buda Engine Designed for Speed Wagons and Speed Trucks.

adjusting of the tappets, while the valve mechanism is lubricated by a mist of oil through breathers from the engine crankcase.

Valves of Large Size.

The valves are of large size, having large valve openings of $1\frac{1}{2}$ inches, are accurately machined and ground and are interchangeable. All valves are closed by barrel type self-centering valve springs, which eliminate side thrust upon the valve stems. The lower end of valve spring and valve spring cup is held fast by a split type wedge grip valve spring retainer lock. This type of lock is claimed to eliminate wear both in the groove in the end of the valve stem, as well as preventing an up or down movement under the valve spring cap.

The valve push rods are of mushroom type, made of special steel and fitted with removable guides. The rods are made unusually large to permit the use of large diameter adjusting screws and maintain correct alignment. The heads of the adjusting screws are fitted with oil hardened tool steel blocks to facilitate alignment and eliminate danger of warpage caused by case hardening. The pistons are of grey iron and fitted with three concentric rings above the wrist-pin and one wiper ring in the lower part

of the skirt. The wiper ring prevents the passage of excess oil into the combustion chamber and the resultant carbonization. Piston heads are cast with ample cooling ribs inside the head to dissipate the heat caused by the present low grade fuels.

Special care is taken in boring and reaming the piston pin holes to insure perfect alignment, accurate size and smooth finish. The piston pins are of special steel tubing, of large diameter and held securely in position by two positive locks. The first is an alloy steel lock screw having two diameters and extending through both sides of the pin to give double shear and prevent improper fitting of the pin. The second is a spring retainer ring which expands in grooves turned in each end of piston bosses.

Main bearings are of three journal type, the main and connecting rod bearings being bronze shell, babbitt lined. The camshaft bearings, which are three in number, are of babbitt, die cast. All main bearings are accurately reamed and scraped to a perfect fit.

The connecting rods are drop forged I beam construction, made of open hearth steel, with no offset. The upper ends are fitted with phosphor bronze bushings and lower ends fitted with

bronze shell babbitt lined bearings. The two connecting rod bolts are of special heat treated alloy steel fitted to each rod.

A cooling fan is mounted on a bracket support bolted to the front extension of the crankcase, forming the timing gear-set case, and is driven by a $1\frac{1}{2}$ -inch belt from a pulley attached to the pump shaft.

Standard Equipment.

Provision has been made for attaching starting and lighting equipment, and for ignition by a magneto driven from the end of the water pump shaft or battery ignition by timer which may be mounted on water pump drive shaft housing. A governor pedestal is mounted behind the rear cylinder and carries a vertical shaft driven by the camshaft. Accessibility has been the fundamental note in providing for the application of accessories, this point being especially appreciated by service station repairers who have frequent need for inspection and adjustment.

Each engine is also fitted with starting crank of large diameter arranged with four-point jaw, forged integral and case hardened. The crank is forged in one piece, having a handle integral, fitted with loose sleeve.

MOTOR TRUCK HAULS TO BE MADE FROM COAST TO COAST

The Red Ball Transit Co., Indianapolis, Ind., has just shown its confidence in the motor truck for long hauls by ordering 100 heavy duty trucks from the Acason Motor Truck Co., Detroit, Mich., which will be used in an inter-city transportation schedule that is to extend from coast to coast.

W. B. Hiner, general manager for the transit organization, states that the scope of work for his company will be greatly increased during the coming year. It is the plan of the company to extend its operations so that it will be doing inter-city hauling to all large cities in the country.

Organized three years ago the Red Ball Transit Co. specializes in inter-city overland hauling. It uses heavy duty trucks with large enclosed bodies resembling moving vans. The main lines now operate to cities between Indianapolis and New York via Cleveland on one route and via Pittsburgh on another. Another line is between Indianapolis and Chicago and another between Indianapolis, St. Louis and Kansas City.

The main headquarters is at Indianapolis, but an office is being established in Chicago. In a few days it will have offices in Cleveland and other important cities through which the service operates. No local hauling is done.

It is the intention of the company to extend its activities so that the routes will reach as far west as the Pacific coast. It has sufficient business on its books to immediately place 35 additional

trucks in operation. The 100 Acason trucks just ordered are to be delivered within a six months period.

The company has been very successful in moving household goods from one city to another. It has an exceptional plan worked out so that the owner of goods is insured prompt delivery at low cost and less depreciation on goods than would occur if freight service was used. The method of payment is unique and appealing. Mr. Hiner comes to inter-city hauling from the insurance business, where he specialized in insurance on goods in transit.

TRUCKS IN ROAD CONSTRUCTION.

Probably no other piece of modern machinery used at the present time in the building of good roads has helped to speed up construction as much as the motor truck.

It is used principally for hauling the many different kinds of material which enter into the construction of the modern roads. The truck will do a hundred and one odd jobs, such as pulling graders, towing cars of material and even transporting employees to and from job.

The Federal trucks shown in the accompanying photograph are engaged at work on new road construction at Central Point and Gold Hill, Nev.

FOSTER TO ASSIST TOLAND.

W. G. Toland, general truck sales manager of Hare's Motors, has announced the appointment of W. J. Foster, formerly assistant truck sales manager of the New York branch of the Packard Motor Car Co., as transportation engineer and assistant to the truck sales manager.



Federal Trucks Engaged in New Road Construction Work on Nevada Highways.

UNION DEPOT FOR COAST JITNEYS



Interior of Union Stage Depot at Los Angeles, Showing the Usual Crowd Waiting for Buses.

AN INKLING of the part the motor bus will one day play in American passenger transportation is gleaned from the wonderful strides this efficient carrying medium has made in California. In Los Angeles when a person mentions the "Union Station" he does not think of the railroad depot, but of the big omnibus terminal.

A little over a year ago the new Union Stage Depot, occupying an area of 13,200 feet, was officially opened to the public. The success of the venture is best indicated in the announcement of improvements and enlargements which will add 4500 square feet to the area of the station.

Two years ago the average monthly carry of the Motor Transit Co., pioneer in the movement for the Union Stage Depot, was 20,000 passengers. Today the Motor Transit Co.'s fleet of 91 White buses carries 200,000 passengers every 30 days. More than half the population of Los Angeles—or 312,000 of the 575,480 residents—use the new Union Stage Depot regularly. A total of 250 buses leave the Union Depot daily.

A completely appointed general waiting room on the mezzanine floor; a ladies' waiting room tastefully furnished with writing desks, comfortable chairs and rockers a barber shop, a drug store, a cigar, confectionery and news stand, a check room, all lend the atmosphere of the metropolitan railroad center.

When his "train" arrives the passenger need only pass through the gate leading to the loading platform, clamber aboard the proper stage and turn over his luggage, if he has any, to be securely stowed away in another compartment.

Service a Vital Factor.

The cars, as they arrive, unload at their respective platforms, then proceed to the loading platform, where 14 stages can be accommodated at one time. Leaving the station the stages follow routes that radiate like strands in a spider web.

Schedules are planned—and rigidly adhered to. Every car entering the Union Station is inspected before it goes out on the road again. If adjustments are found necessary the car moves into the service station, maintained a few feet from the loading platform, and repairs are made. Should the inspectors "condemn" a car for repairs that will require some time to complete, a "guard" car is ordered to jump into the breach and make the run of the incapacitated car until such time as it is ready to resume its duties. Thus, as time loss is reduced, service is increased and the public is the gainer.

But there are other ways in which the public benefits. In fact, the low rates now charged for motor stage travel are the composite result of a series of benefits that began to accrue on the day the Union Stage Depot first threw open its doors. In the first place, the "pooling" process cut administrative overhead

nearly 50 per cent. by eliminating duplications and concentrating maintenance facilities. Furthermore, service really began only when centralization and team work were applied as a stop gap to the extravagances and duplication of the "every-man-for-himself" regime.

Benefits of Consolidation.

Back in 1917, when the subject of a Union Stage Depot was first broached, the independent lines were pursuing the hit-or-miss plan of picking up their passengers at street corners. Then early in 1918 the White Bus Line—now part of the Motor Transit Co.—moved into its new depot and adopted the policy of taking on passengers at this central point. The success of the innovation gave new impetus to the Union Depot campaign.

Soon the managers of the Pickwick Northern, the Pickwick Southern and the United stages became interested in the consolidated depot proposition, with the result that February, 1919, saw the organization of the Union Stage Depot, Inc.

Shortly afterward the El Dorado Stage Line was taken over by the White Bus Line, which a little later also annexed the Mt. Wilson and the Murrietta lines. With the subsequent annexation of the Orange Belt Line, all the principal lines in operation were brought into the Union Depot, thus crowning the efforts of President O. R. Fuller of the White Bus Line, now president of the Union Stage Depot, Inc., in the interests of the pet project which he fathered from the time it met its first rebuff until the day it won recognition as one of the city's strongest assets.

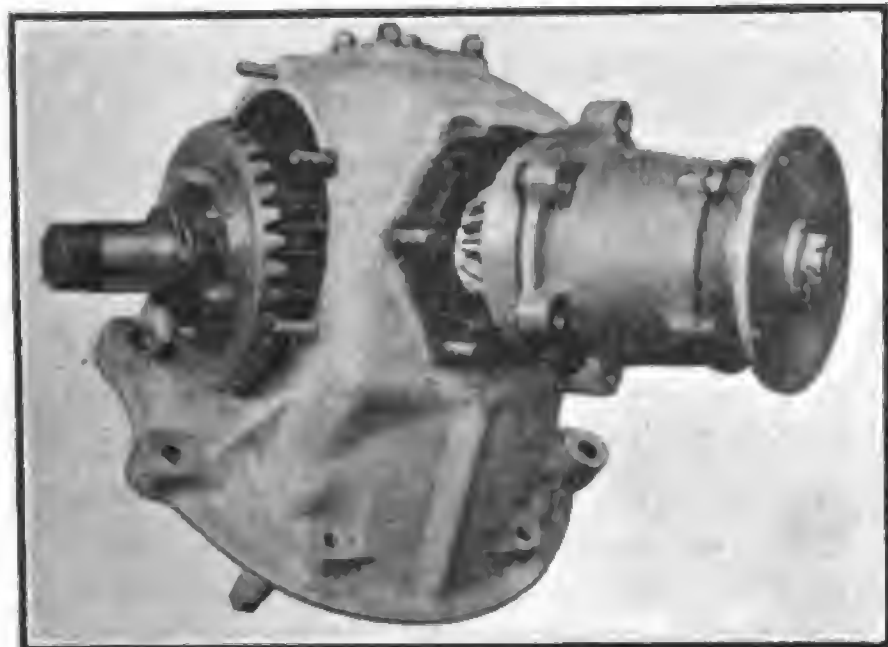
BODY PLANT TO BUILD.

Greenwood Body and Wagon Co., Greenwood, S. C., recently organized to manufacture truck and wagon bodies, has arranged for the erection of a one-story plant.



Exterior of Union Stage Depot at Los Angeles, a Forerunner of What the Future Holds for the Motor Omnibus.

DOUBLE REDUCTION TYPE AXLE TO BE STANDARD ON MACK TRUCKS



Accessibility a Strong Feature of New Dual Reduction Drive in Mack AB 1½ and Two-Ton Chassis. Change of Gear Ratios Is Made in the Simplest Possible Manner.

A SERIES of tests staged by the International Motor Co.'s engineers were held recently in New York city in the presence of a considerable number of engineers and representatives of the trade press for the purpose of demonstrating the mechanical efficiency of a new type of rear axle originated and developed by the company for its own individual use.

The successful demonstration was followed by an announcement that the company was so firmly convinced of the industrial value of the axle that it intended to incorporate this in all trucks thereafter produced that were driven by enclosed gearing, as soon as its present stock of purchased axles is exhausted.

The claim is made by the company that this axle is the result of experiment and development extending over a period of five years. The company originally drove all its trucks with double side chains, and this form of propulsion is now used in all the larger machines. Later on, to meet a demand from those

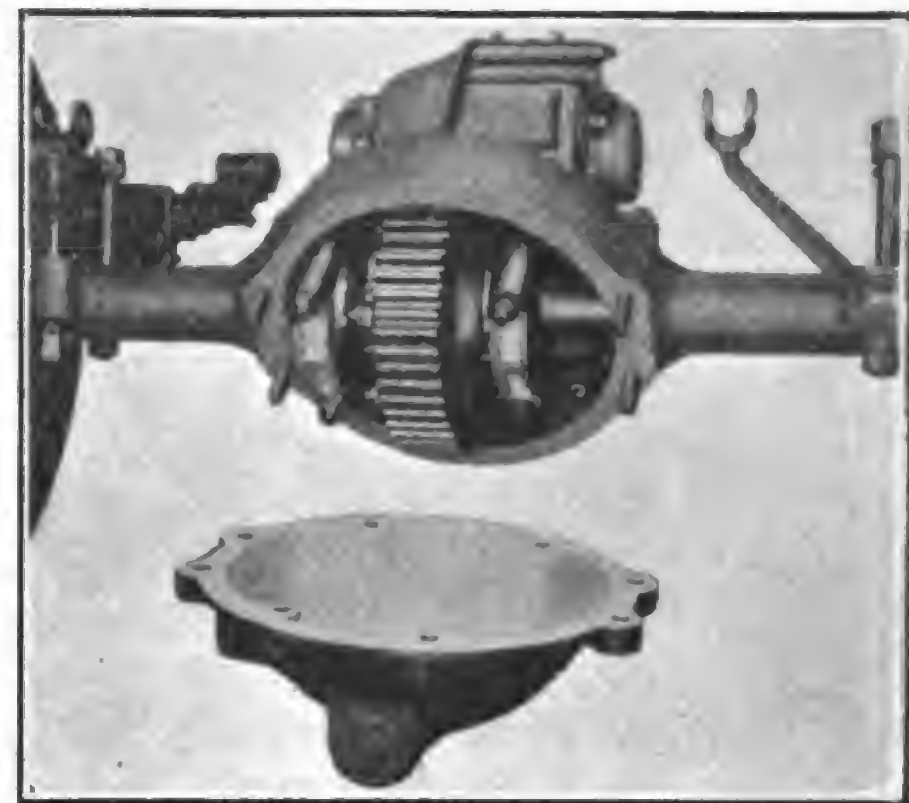
who rejected the chain because of belief in the superiority of a fully enclosed method of power transmission, the company built its smaller trucks with worm shaft and worm wheel drive.

The policy of the company has been to build all construction units so far as possible, and the purchase of worm shaft and worm wheel axles did not coincide with this. Not only this, the company's engineers believed that another form of axle would nearer approach its engineering standards, and this led to the experiments and development of the axle it has just adopted.

The new axle is known as a double reduction type, and its mechanical principles have been proven in practise beyond all question. It is in the adaptation of these principles to the axle design that engineering progression has been made. The design has been worked out skillfully and a highly perfected mechanism has been obtained. That there shall be no misunderstanding of its policy statement should be made that the company has consistently maintained that chain propulsion is the most efficient, flexible, reliable and economical of all forms of drive used in truck construction, and that the double reduction axle has been developed as the nearest approach to it to meet an insistent and unescapable demand for a fully enclosed power transmission system for certain uses.

Exclusive in Design.

The dual reduction axle, while embodying nothing radical or untried in mechanics, is distinctly original and exclusive in design. It is an enclosed drive rear axle, consisting of nothing but toothed gears, four in number, the gear unit being one compact assembly located at the middle of the axle and driving



Bull Gear Assembly; Rear Cover Removed, Allowing Removal of Bull Gear as a Unit.

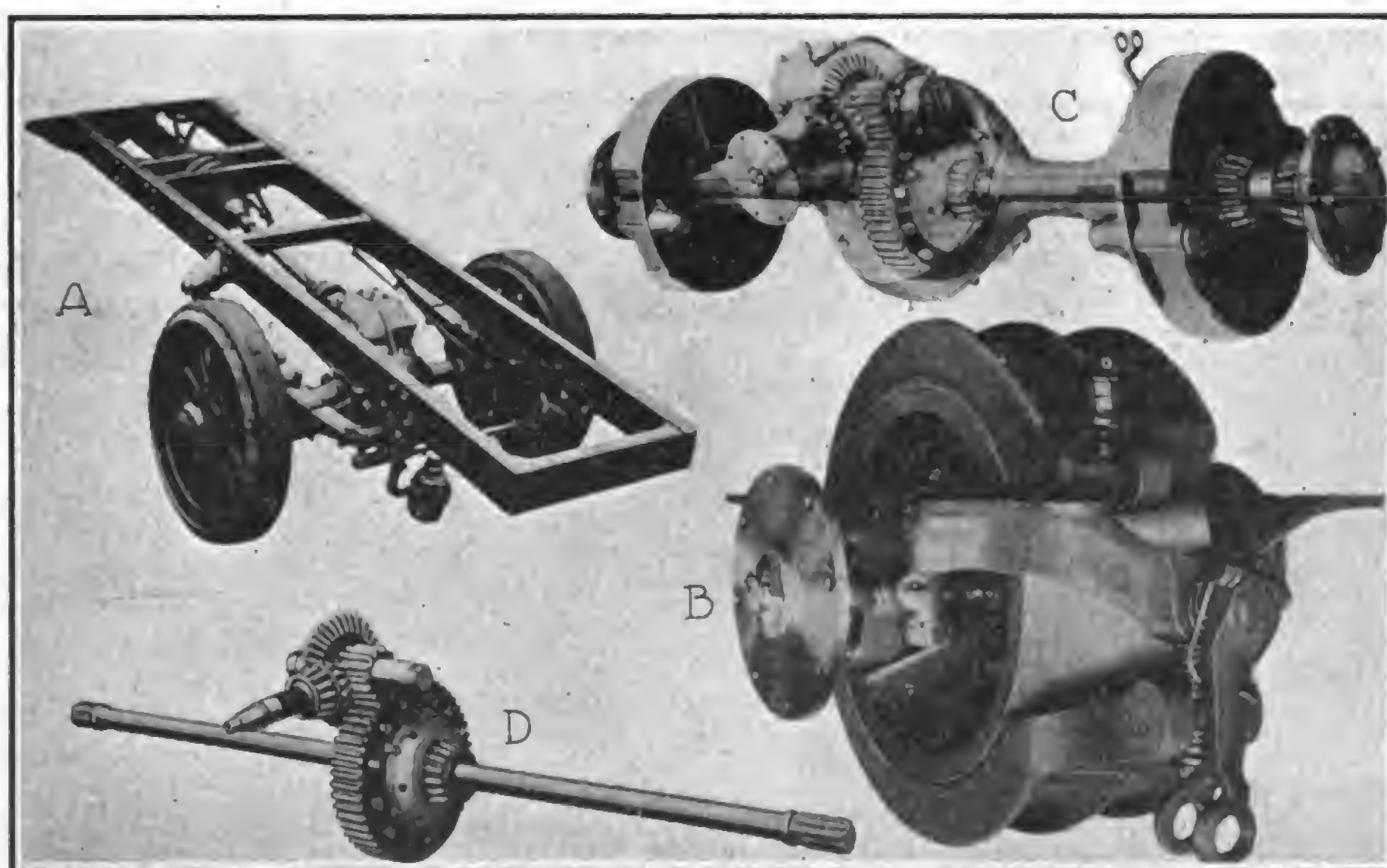
through the conventional live rear axle shaft. It is of full floating construction, using Timken tapered roller bearings of unusually generous size throughout. It is composed of two principal members, namely, the load supporting portions and the driving arrangement.

The load is supported on a one-piece drop forged axle with a wide yoke at the center which encircles the gear unit. This single forging of chrome nickel steel embodies the entire axle beam, yoke, wheel spindles and spring perches in one piece. The driving portion of the axle comprises a cast aluminum alloy housing and back cover, with chrome vanadium steel axle shafts running through the hollow tubular axle. The yoke or banjo of the axle forging is inclined at 45 degrees backward from vertical so that it slants downward and forward, thus having its greatest strength in the plane in which road shocks are transmitted. As the truck travels over the road, road shocks are not transmitted directly upward to axle, but obliquely, so that the inclined yoke is several times stronger than it would be if it were placed vertical or horizontal. In addition, the inclination of the yoke increases the ground clearance without reducing the possible size of ring gear. It throws the gear train on an angle which shortens the length of the driving shaft, lowers the overall height of the axle center and produces an absolute straight line drive under load.

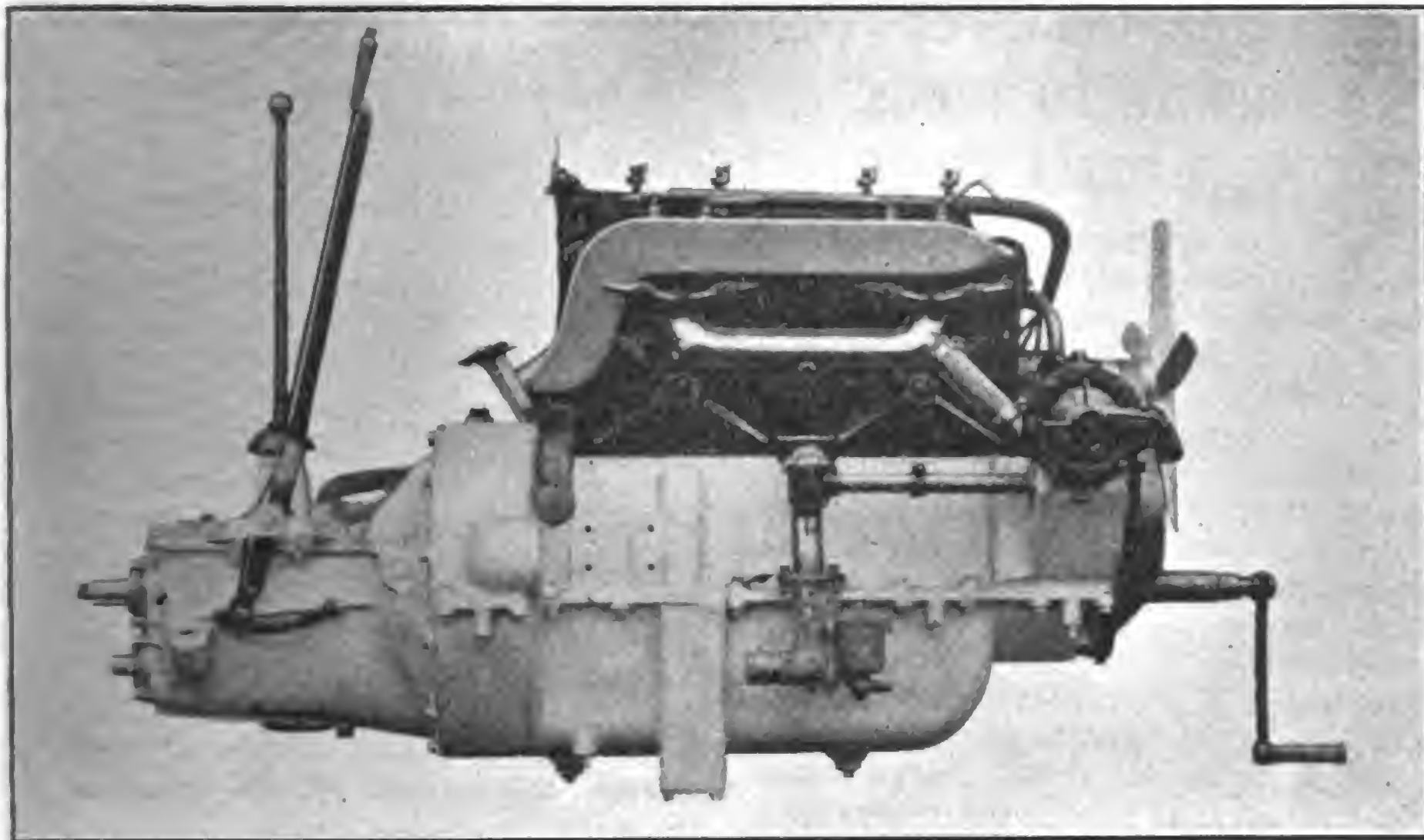
Similar to English Design.

The dual reduction drive is somewhat similar to the arrangement which is so popular in England and on the continent, where it is fast displacing many other forms of final drive. It is unique in the inclined position it assumes and in the ease with which the parts may be gotten at for disassembly purposes or adjustments.

The differential occupies the position usual in worm or bevel driven axles, being driven by a ring gear. This ring gear is a large spur type, known as a bull gear. It is driven by a smaller spur pinion, both gears being of 2½-inch face.



New Dual Reduction Drive for Mack AB Chassis: A, Chassis Showing Location of Dual Reduction Drive and New Emergency Brake Drum on Drive Shaft in Special Hanger; B, Enlarged View of Emergency Brake, Showing Details of Construction; C, Phantom View of Dual Reduction Drive in Axle Housing; D, Showing Relation of Gears in New Dual Reduction Drive.



International Heavy Duty Engine Used in Mack AB 1½ and Two-Ton Chassis.

The spur pinion is integral with the short jackshaft upon which is mounted a bevel gear. This bevel is driven by a bevel pinion on the end of the drive shaft. The first reduction is therefore through a pair of bevels and the second through a pair of spur gears. The axle shafts are splined into the differential at one end and into the hub caps at the other.

The Mack dual reduction axle weighs about the same as the worm driven axles the company has been using, but the capacity of its bearings is from 1 1/12 to 2¼ times as great. The road clearance of the worm driven axle is 9½ inches, while that of the dual reduction axle is 10¼ inches. All bearing adjustments may be made without disturbing the assembly of the parts. Either the differential, jackshaft or pinion shaft may be removed from the dual reduction axle without disturbing any of the other parts.

Four Optional Gear Ratios.

Four different gear ratios may be obtained with the dual reduction axle, 5¾, 7 6/10, 9¼ and 10¾ to one respectively. A change in gear ratios can be easily made since it is not necessary to dismantle the axle or change the adjustment of the differential. The only gears affected by the change are the bevels, and only two new parts are required to get a new gear ratio, that is, pinion shaft and bevel gear. To accomplish this the pinion shaft is removed bodily at the front and the jackshaft at the side. The new pinion shaft is installed and a new bevel gear substituted for the old one on the same jackshaft by means of six bolts.

All ratios of the dual reduction are practically of the same efficiency and accordingly, where severe working conditions are likely to be encountered, the low ratios may be used freely and it is thought that an effort should be made to push the 9¼ ratio in most cases of this sort.

Hotchkiss Drive Retained.

Agreeing with previous practise, as warranted by satisfactory experience, the Hotchkiss drive is used in the dual

reduction model as it was in the worm driven type. Conditions have been made even more favorable for Hotchkiss drive, however, due to the use of longer and stronger springs, held to wide spring perches by heavier clips and having larger spring eyes supported in new spring brackets, which support both sides of the pin instead of only one, as formerly. These new springs are 54 inches long and 3½ inches wide, carrying 1¼-inch reamed self-lubricating bushings, and carrying four rebound clips bolted through eyes on intermediate leaves.

Several New Features Added.

With the improvement in the rear axle and springs have come several other important changes that increase the sturdiness of this already rugged chassis. A new brake arrangement, similar to that

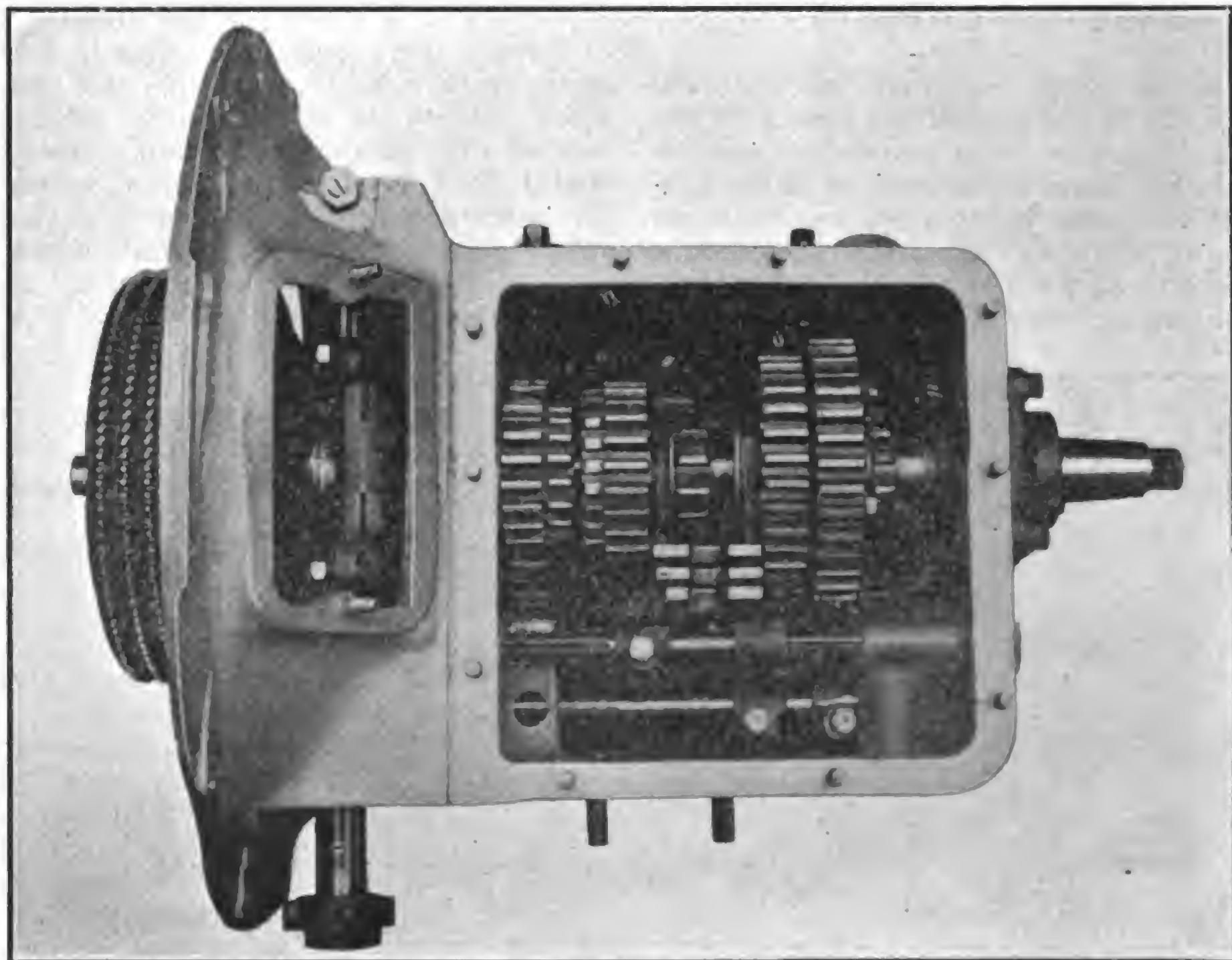
on the chain drive models, but having larger surfaces has been used, the foot brakes being in the rear wheel steel drums and the hand brakes on the drive shaft. The hand brake has been placed mid length of the shaft, which is thus divided into short lengths with four universals instead of three, as in the worm drive. These universals are larger than formerly used, so that the stress upon them is reduced 43 per cent., and whipping, even at the highest possible speed, is said to be eliminated.

The effective surface of the new shaft brake is more than three times that of brakes formerly used. It is 11 inches in diameter and six inches wide, of the contracting type, the shoes being deeply ribbed drop forgings and the entire brake assembly mounted on a rigid, three-point supported drop forged frame between two closely spaced cross members. Each lining is six by 12 inches in size.

New Engine Crankcase.

The new dual reduction AB Mack will share with the chain driven AB a number of other improvements, such as a new engine crankcase having three gallons oil capacity, as against 1¾ gallons on the old engine and the new Mack unit power plant clutch and gearset, built entirely in the New Brunswick plant. This gearset is similar to the Brown-Lipe in general design, but incorporates a number of important improvements.

The main shaft is splined, the splining being of the interrupted type, in which the gears are guided on the ground surfaces between short sets of splines, giving a much smoother action and greater rigidity. The case is larger and holds more lubricant. An extension countershaft with a keyed power take off is



Clutch and Gearset in Mack AB Chassis, Unit Construction with Engine. Rugged Construction of Units and Unusually Wide Gear Faces Typical of Mack Chassis.

standard equipment. A standard S. A. E. tire pump mounting is provided on the side of the case to receive a pump for the inflation of pneumatic tires. The control has been simplified by the elimination of the reverse latch trigger. Instead the lever is one solid piece and the reverse lock is released by simply depressing the entire lever.

The Mack front axle is already in exclusive use on both chain and worm driven models and will be continued on the dual reduction model, as well as the Mack steering gear with the rubber hand wheel. In all other prospects the dual reduction type is similar to other Mack products.

As the dual reduction models are a refined and improved product, both development and production involving greater expense, its cost to manufacture is necessarily considerably higher than of the older types. Thus it is explained a higher price is inevitable as well as fully warranted by actual merit.

The prices of the new dual reduction models are as follows: One and one-half tons capacity, \$3450, and two tons capacity, \$3750.

SLEDS AS TRUCK TRAILERS.

Sleds as trailers are the latest equipment for motor trucks that is adding to their usefulness for year-around performance. On a tie hauling job at Nelson, Col., an FWD truck is doing the work of six teams in the hauling of ties through snow from five to 20 inches deep, with the aid of this equipment.

The sled skids track perfectly in the trail of the truck. About 50 ties are carried on the truck and 60 on the trailer. The weight of each tie varies from 100 to 150 pounds, making a total of about 10,600 pounds per load hauled.

MAKE HORSE OWNERS PAY.

In the belief that truck and car owners should not pay all the road bills the Massachusetts State Automobile association has had a bill introduced in the Legislature fixing registration fees for horse drawn vehicles. The bill provides a scale of \$2 for a one-horse hitch and \$5 for two or more horses.



FWD Truck Hauling Ties Through Snow at Nelson, Col., with Sleds as Trailers.

WHITE ROLL CALL FOR 1920 A TRIBUTE TO TRUCK UTILITY

The White company's annual tabulation of owners whose White trucks have gone 100,000 miles and more in work-a-day service for 1920, shows 533 Whites have traveled 100,000 miles and are still going; 106 have exceeded 150,000 miles; 94 are somewhere on the 200,000-300,000-mile lap, while 25 trucks have forged well beyond the 300,000 mile mark. The figures in each group are nearly double those revealed by the 1919 tabulation.

Only owners of White fleets of 10 or more trucks are represented in the roll call, several of the larger companies operating in excess of 500 trucks. The 1920 roll call lists 3691 fleets, comprising 40,919 trucks—a gain of hundreds of owners who have grown to the "fleet" class.

Two owners have invested over \$2,000,000; four others between \$1,000,000 and \$2,000,000; five owners between \$500,000 and \$1,000,000; 22 owners between \$250,000 and \$500,000, and 82 owners between \$100,000 and \$250,000 in White trucks.

It is noted that in the closing months of 1920 New York city placed with the White company the largest single order for motorized transportation equipment ever placed by a municipality. It called for 212 five-ton dump trucks for the street cleaning department, an investment of nearly \$1,500,000.

COURTESY ON THE ROAD.

An article from the February Mack Bulldog, published by the International Motor Co., New York city, on "Courtesy on the Road" contains the following observations of a passenger car driver:

"I really don't believe you men in the motor truck industry appreciate that the truck drivers, to a very large extent, control this matter of popular opinion. And I don't believe the drivers realize the importance of popular opinion to the future of motor truck transportation and consequently to their own future. If every driver of a motor truck made it a

point to keep over on the right hand side of the road and really be considerate of the passenger car driver, I believe it would make people feel differently toward the motor truck. I believe you would find then that legislators and the public in general would be open to conviction on the necessity for increasing the facilities for supporting their extended use."

Don't know but what he is right?

RECORD PLATE ON U. S. TRUCK.

To remind the customer of the value of having the important data pertaining to his truck in the possession of the manufacturers, the United States Motor Truck Co., Cincinnati, O., has determined to place on the toe board just forward of the steering column an aluminum plate, to be incorporated later, it is said, with the standard caution plate, bearing the following request:

"Purchaser of this truck communicate at once with factory, giving model, number and date of purchase. Quick service for owner depends upon this."

"It is our belief," say the officials of the company, in announcing the new feature, "that the scheme will be effective in keeping a record of each truck in service, regardless of the number of times the truck may change hands."

"Not only will the original purchaser see the advantage of communicating with us, but the man who may purchase a used United States truck will also be convinced that writing us will be to his advantage. By this method we can change our records and keep our trucks in view for many years."

DENBYS IN U. S. SERVICE.

Denby two-ton trucks are giving satisfactory service for the U. S. Postoffice Department in the following cities: Akron, O.; Birmingham, Ala.; Canton, O.; Chicago, Ill.; Columbus, Ga.; Dallas, Texas; Des Moines, Ia.; Detroit, Mich.; Grand Rapids, Mich.; Harrisburg, Pa.; Indianapolis, Ind.; Kansas City, Mo.; Los Angeles, Minneapolis, Nashville, Tenn.; New York city, Oakland, Cal.; Portsmouth, O.; St. Paul, Minn.; Youngstown, O.

This announcement in the January issue of the Denbyman also states that the Bay City Auto Body Co., Bay City, Mich., contractors to Uncle Sam for mail bodies, is now engaged in installing bodies on several hundred Denby chassis.

TRUCKMEN'S PUBLICATION.

The Merchants' Truckmen's Bureau of New York, an organization of truckmen recently formed, begins with February the publication of the "Commercial Transportation News" as its official organ. It appears in magazine form with a cover which carries the table of contents. The leading article of the first number is by Dock Commissioner Murray Hulbert and it deals with the improvement of the port of New York.

In Philadelphia and at Dallas, Tex., local associations of trailer dealers are being formed for the purpose of acting in concert in the general promotion of trailer sales, in furthering highway improvement and securing proper recognition of the trailer in motor vehicle legislation. Associations in several other cities have broadened their scope and changed their titles to Motor Truck and Trailer Dealers' association.

FRUEHAUF HEAVY DUTY LOGGING TRAILER



Load Does Not Cramp on Forward Bolster When Turning Corners, but Is Parallel with Reach.

THE Fruehauf Trailer Co., Detroit, Mich., is in quantity production on its new heavy duty logging trailer, which is particularly adapted to logging operations in the northwest, but can also be used to good advantage by trucking concerns in the larger cities who find it necessary to haul heavy machinery, steel building girders, steel rails or other extra long heavy material.

Two years have been spent, to good advantage, by the engineers of the company in the factory and the northwest lumber regions, where first hand information was gained of what was required of a trailer to successfully handle saw logs and lumber in its various forms.

The new heavy duty trailer, recently announced, is the result of these investigations and experiments of the engineers. The manufacturer claims that it embodies all necessary time tried features, besides 12 special features that have been adopted after careful experimental and test work both at the factory and in the northwest logging district.

Construction Features.

Perhaps the outstanding feature of this new trailer is its connection, which permits the tractor and trailer with its load to turn at any angle permitted by the truck wheels and the reach, without shifting the load. The new connection centers the turning radius of the reach at the king pin of the forward bolster directly over the rear axle of the truck. The king pin carries no part of the load,

but merely centers a guided arm, which directs the pull of the reach on a circular rail, which absorbs all of the strain.

The arrangement is simplicity itself, and so far as known, is the only coupling connection of its kind that permits the reach to remain parallel with the load at all times, thereby insuring that the load will remain in the same position when turning a corner as when traveling in a straight line. The connection is universal in type and has been designed so that it can be applied to any make, size or style of truck. It is attached to the truck entirely by clamps, and statement is made that installation is so simple that it is not necessary to send trucks to the trailer factory, or to a shop especially fitted for the work. The attachments can be easily installed by the ordinary mechanic in a few hours time, as it is not necessary to drill holes in the truck frame when attaching the units.

Triangular Frame.

The trailer proper is of ordinary double bolster type. The bolsters are of all steel construction and the frame is triangular in shape rather than diamond, as has been the standard shape in the past. This change in frame design is claimed to eliminate dead weight and permits the use of a shorter reach without effecting the strength of the trailer.

The rear anchorage of the reach is through a housing on the axle. The reach is made of structural or pressed

steel fitted with wood filler. This type of construction insures easy sliding of the reach and maximum strength with minimum weight.

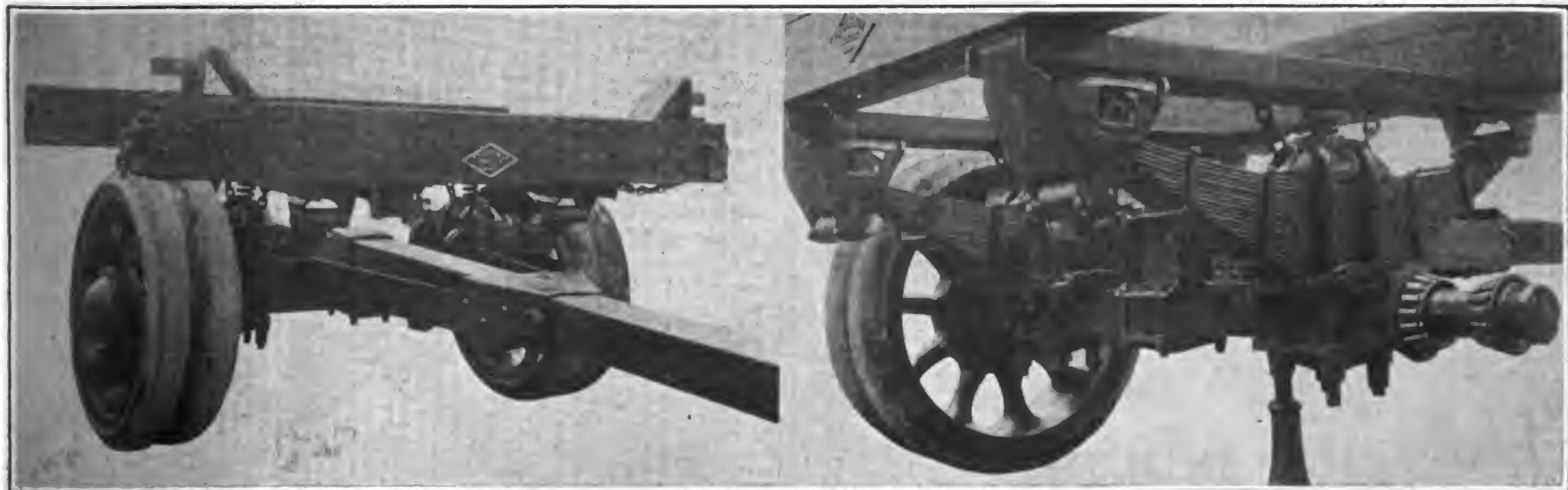
Another important feature is the use of spring check chains and coil shock springs, which are said to absolutely eliminate all possibility of broken springs. This has been a defect frequently found with trailers of large capacity in the past due to the fact that in loading or unloading it is not unusual and is sometimes necessary for the weight of the entire load to be thrown to one side of the trailer before the load is centered. This results in an upward pull on the opposite spring, which was designed to resist a downward thrust rather than an upward pull. A snapping of the upper spring leaf has usually followed.

The spring check chains in the new trailer unit are so arranged that when the upward pull on the spring reaches a maximum point the strain is transferred through the chains directly to the trailer axle, in this manner relieving the spring of all but the normal strain and preventing accidental breaking of the upper leaf. These chains act in the same manner as shock absorbers on a pleasure car.

The coil shock springs are claimed to eliminate the danger of overloading the springs from the load itself, through accident in dropping the load, or through unusual road conditions. When the spring reaches a given tension the weight of the load is carried directly on the axle.

Axle and Collar a Unit.

The axle and collar are one piece. The axle spindles are upset to form the collar. This type of construction gives a strength which cannot be equaled, according to the finding of the Fruehauf engineers, as compared to the shrunk on collar, and permits the machining of a maximum sized spindle on the three by five-inch axle shaft. The spring shackle brackets have also been strengthened by making them in box form, giving a freedom of action to the shackle and great strength that could not be obtained by any other method.



Massive Construction of Fruehauf Logging Trailer with Dual Tired Wheels Fitted with Timken Roller Bearings. Chains Between Spring Block and Frame Prevent Tipping of Trailer When Loading.

Wedge blocks operate from the side opposite without the use of hooks or rings. In unloading the wedge blocks automatically disengage from their seating and drop over the end of bolster, thereby clearing the bolster for passage of the load.

The new unit is finished in every detail. No angle of improvement, it is stated, based on sound engineering practice or actual experience, has been left out. The trailer is equipped with Timken bearings in the wheels, Smith steel wheels, three by five inches, drop forged, heat treated, one piece axle, Alemite oiling system, which forces lubricant to all slow moving bearings at a pressure of 500 pounds to the square inch, self-locking wedge blocks and bronze bushings throughout.

Thoroughly Equipped.

The development of the universal connection which can be applied to a motor truck in any camp by the average mechanic using common tools, has led the Fruehauf company to market this unit completely equipped. Quotations include every part and every connection necessary to fit the truck to which it is to be attached. The equipment includes the trailer proper, reach, connection, forward bolster, bolster plates and circles, all king pins and clamps. The purchaser provides only his truck and the forward bolster platform to make a complete hauling unit.

Specifications.

Axle—Three by five-inch rectangular, dead type, special heat treated steel drop forged, collar and axle in one piece, four-inch spindle.

Bearings—Timken roller type, all bearing parts equipped with phosphor bronze bushings.

Springs—Semi-elliptic, 50 by five-inch, 22 leaves uniformly graduated, made of high carbon steel, special heat treated, fitted with 1¼-inch chrome nickel steel clips.

Rear Shackles—Box form, shackle bolts 1¼ inches diameter, carbonized, heat treated and ground.

Wheels—40 by 14 inches, Smith cast steel fitted with heavy steel hub flanges.

Tires—40 by 14-inch giant pneumatics or 40 by seven-inch solid, pressed on type duals.

Castings—Best quality electro converted steel.

Frame—Heavy weight eight-inch structural steel.

Hounds—Four by five by ¾-inch structural angle steel. Hot riveted to spring seats and reinforced by heavy "U" bolts.

Bolsters—Eight feet long, constructed from three pieces heavy structural channel steel. Rear bolster reinforced with hardwood filler, forward trailer bolster left open and flanges exposed to prevent slippage of logs. Equipped with wedge blocks and chain wedge block locks. Truck bolster same as forward trailer bolster.

Wedge Blocks—Plated with ¾ by six-inch rolled steel; height, nine inches; movable type. Unlock from opposite side and slide over end of bolster when released, ½-inch chain connects to wedge block through center of bolster and through plate at opposite end. Plate is slotted to form lock and blocks may be locked in any desired position.

Trailer Connection—Fruehauf universal (patent applied for). Four-inch I beam, circular in form, fitted with heavy steel gusset plates. I-beam forms track on which draw bar of trailer connection travels. Draw bar swings with a guiding arm centered on king pin of forward bolster, providing perfect turning radius. Connection standardized to fit any make, style or type of motor or motor truck tractor. It is attached without drilling truck frame and may be connected by any mechanic.

Trailer Connection Pin—1½-inch carbonized, heat treated steel stock. Self-locking type, requiring no nuts or keys.

Reach—Structural or pressed channel steel with wood filler to insure easy sliding and give maximum strength with minimum weight.

General Dimensions—

Tread—72 inches.

Height—From ground to top of rear bolster, 50 inches; from ground to top of truck bolster, 55¼ inches.

Bolsters—Eight feet long.

Road Clearance—17½ inches.

Adjustment—Maximum length from center line of trailer axle to connection, 25 feet; minimum length, 10 feet.

Oiling System—Alemite, all slow moving bearings.

Capacity—Ability of truck to which it is attached.

PROPOSED TRUCK STANDARDS.

Few changes in truck standards were suggested at the January S. A. E. meeting at New York city. A proposed standard emergency rim clamp so designed that a truck equipped with 36x6-inch wheels in front and 40x8-inch wheels in the rear can carry a 38x7-inch rim as spare with a 40x8-inch tire (the latter being a standard oversize for 38x7-inch) and thus make it unnecessary to carry two sizes of spare tires was offered, but was referred back to the committee because it was evident that the proposed lug had not been sufficiently tested. A slight revision of the present standard rim clamp bolts was approved, as was also a set of standard dimensions for passenger car wheel spokes.

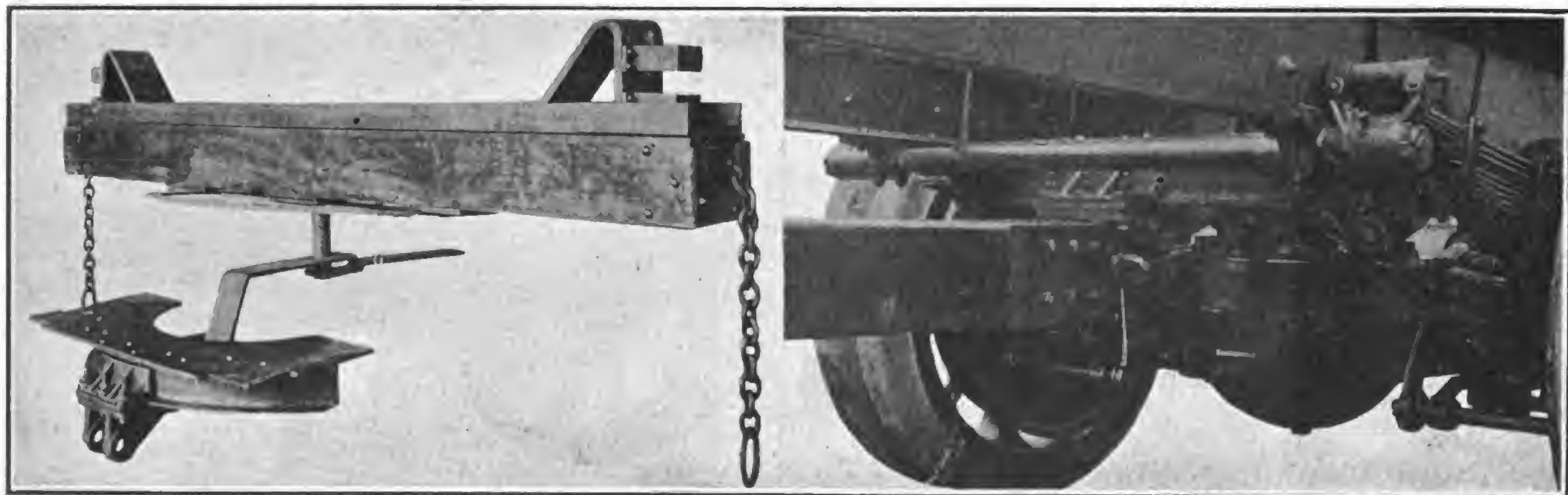
OKLAHOMA TRUCK SHOW.

The motor truck dealers of Oklahoma City, Okla., held the first exclusive motor truck show ever held in Oklahoma, Jan. 18-21. There was a good showing of vehicles and equipment and a big attendance. The dealers were more than satisfied with results.

The motor truck show committee consisted of H. J. Succop, GMC Truck Co., chairman; G. M. Head of the J. Carl Finch Motor Co., Day-Elder and Commerce distributor, and Bart L. Russell of the Earl M. Stapleton Co., Duplex distributor. George W. Woods was manager.

TRUCKS TO COVER FRUIT BELT.

The California Rapid Transit Co. is planning to operate a fleet of 20 trucks in the Los Angeles valley on four routes covering the entire fruit and product belts in that territory. The trucks will be especially built for the purpose.



Method of Attaching Logging Reach to Truck Frame Shown at Right; Front Bolster, King Pin and Circle Shown at Left.

NEW HIGHLAND CAB AND STAKE BODY

The Highland Body Manufacturing Co., Cincinnati, O., is showing its new type of Everyday Cab and heavy pattern of Standard Stake Body.

A special plan for marketing its product is carried out by the Highland Body Co., through the establishment of a factory branch in Detroit, right in the heart of the motor truck district, which makes it possible for the distributor to ship his trucks complete to his dealers practically the same day that the order is received.

This type of service enables the distributor to carry only the chassis, purchasing a suitable body on short notice without tying up capital in a stock of bodies which may not be suitable for his dealers' needs.

Another point which the organization emphasizes is that it costs no more to ship a truck with a body and cab attached than it does if the chassis is shipped alone.

Special attention is given to the Everyday Cab, which is of the all-weather type, fitted with hinged doors and heavy glass windows in the sides, doors and rear and also the glass windshield, which is hinged at the top of cab and is held in any position of angularity by suitable fastening arms at the sides. Two panes of heavy glass are fitted to the shield, and are separated by a wooden strip through the center, lessening the chance of breakage.

This well lighted cab fills the bill for the truck driver who finds it necessary to be out in all kinds of weather. Deep cushions are provided for the seats and also a covered spring lazy back in the rear. The windows drop down out of sight in slots at the bottom, allowing the driver a cool cab for summer driving and, with the windows in place, a warm cab for winter operations.

Standard Body Heavy Pattern Type.

The Highland standard heavy pattern type body is constructed in lengths inside of 120, 132, 144, 156 and 168 inches, widths inside of 60, 66, 72, 78 and 84 inches.

This body is so designed that the platform is standard for all types of trucks, and admits of a variety of stake arrangements. The stakes are held firmly in iron pockets four inches deep, insuring absolute stability, even the highest stakes used. The stakes are inserted in the sill pockets, which are then bound with iron, exposing only the flush edge of the platform. Bodies, 120 inches to 132 inches inclusive, have six stakes to a side. Longer bodies are equipped with eight stakes to a side. Bodies 60 inches wide have three stakes on the end; wider bodies, four. Regular height of stakes above the platform is 40 inches.

Another form of body which this company is building is the Everyway Body for farm trucks, and the company states that this type of body is meeting with ready sale, especially in rural districts,

as this body offers many features that appeal especially to the farming interests.

This type of body is being built for trucks having a capacity of from $\frac{3}{4}$ ton to $3\frac{1}{2}$ tons with a cubic feet capacity ranging from 55 to 144. Many different forms may be made with this body, including a stock rack, grain tight body, low grain tight body, basket rack arrangement, etc.

These bodies are constructed of the best materials obtainable and are well ironed at every possible place where excessive wear or strain can occur.

The illustration shows how an Everyday cab and a heavy pattern standard body looks on a U. S. motor truck chassis.

SERVICE TO READERS.

MOTOR TRUCK will be glad to furnish truck owners or drivers with correct data concerning the most reliable routes for proposed trips in any part of the country. This information will be given in simple form so that the driver will find the going easy from point to point.

MOTOR TRUCK stands ready at all times to give any of its readers any service within its field. Queries are always welcomed and will be given immediate attention.

MACK CHANGES IN ST. LOUIS.

The International Mack Corporation has taken a long term lease of commodious new quarters at the southwest corner of 28th and Pine streets and has established large sales and service quarters. Complete equipment for the servicing and repairing of Mack trucks has been installed. J. C. Smith is manager.

ENGINE ACCESSIBILITY REDUCES UPKEEP COSTS.

Owners and managers of big motor truck fleets were guests at the Pierce-Arrow Motor Car Co.'s factory at Buffalo recently when service managers of the factory's nation-wide chain of service stations held their annual convention. The fleet operators witnessed practical demonstrations of the manner in which the modern construction of Pierce-Arrow dual valve trucks has decreased maintenance costs.

"Our engineers have made Pierce-Arrow dual valve trucks so accessible that repairs are accomplished with an ease and facility heretofore unknown," said F. J. Wells, head of the Pierce-Arrow service organization. "Where hours or days are required to remove, tear down and rebuild units of some trucks, the same work is accomplished with almost unbelievable quickness in the case of Pierce-Arrow trucks. An exclusive accessibility compels a downward revision of upkeep costs."

A feature of the convention was an exhibit of the details of construction of the dual valve truck engine, which, the company maintains, yields 30 per cent. more power, gives the truck a 50 per cent. greater hill climbing ability and yet effects a 20 per cent. decrease in gasoline consumption.

TRUCKS AT TRENTON SHOW.

The Trenton Automobile Show will be held in the Trenton, N. J., Armory, Feb. 16-19. In addition to exhibiting cars there will be exhibits of Packard, White, Mack, Service, American LaFrance, Reo, Brockway, Ford, Pierce-Arrow, GMC, Autocar, Stewart and other trucks. There will also be a large exhibit of accessories for trucks and cars. Service managers and owners were given a clear insight into the qualities of the engine which make these results possible.



Everyday Enclosed Cab and Standard Stake Body Fitted to United States Motor Truck.

WOMEN AND TRAILERS AIDS TO TRUCK

MACK PARTS DESIGNER IS FIRST WOMAN MEMBER OF S. A. E.

The Society of Automotive Engineers is no longer a "stag" organization. No field is immune against the advances of the 20th Century Eve. The S. A. E. had no bars up. On the contrary, its first woman member, Miss Marie Luhring of the International Motor Co., New York city, maker of the Mack truck, has been received with acclaim. Miss Luhring's advent in to this line of work and her acceptance as an S. A. E. member is an item of special significance to all the industry.

Miss Luhring, after she had finished her elementary and high school education, decided to make use of her ability at drawing by studying interior decorating. It was necessary for her to take a one-year course in architecture as preparation for this study. During this course she became so interested in architectural engineering that she abandoned interior decorating and continued the study of architecture. On the completion of this course Miss Luhring obtained employment with the Sage Foundation Homes Co. as architectural draughtsman. She left this position in order to make a trip abroad.

At the time of her return from Europe practically all building in the United States had ceased because of the outbreak of the war. As this necessarily caused a cessation in activity in the architectural field, Miss Luhring secured employment in the production of animated cartoons.

This position did not, however, offer any opportunity to develop in the engineering profession for which she had spent considerable time in preparation. Therefore, when the expansion of the motor truck industry gave promise of the important position which motor vehicles were to take in the nation's transportation, Miss Luhring decided to enter the field of automotive engineering. She became a member of the engineering department of the International Motor Co., designing motor truck parts, and has enjoyed marked success in the work.

Miss Luhring is not resting on her laurels, however, but has just entered the second year of a course in "Designing and Testing of Automotive Vehicles," conducted by Ethelbert Favary at Cooper Union night school in New York city, as she is not content with being the leading woman member of her profession, but aspires to gain distinction through ability without consideration for sex.

WARD LA FRANCE BRANCH.

The Ward La France Truck Co., Inc., Elmira, N. Y., has opened a direct factory branch at Chicago. G. E. De Long, former sales manager, is in charge.



Miss Marie Luhring, First Woman Member of S. A. E., at Work in Mack Plant.

R. J. FIRESTONE VICE PRESIDENT OF U. S. MOTOR TRUCK CO.

The U. S. Motor Truck Co., Cincinnati, O., has added materially to its recognized prestige in the automotive industry through the announcement from President R. C. Stewart that R. J. Firestone, who has long been a national figure in the rubber industry, has been elected a vice president of the organization. This alliance is a new tribute to the solidity of this forward going concern, which has long been firmly entrenched among the leaders in its field.

The U. S. Motor Truck Co. held its annual meeting Jan. 27 and the glowing reports indicated that the supposed depression had left this institution unscathed. Plans for a banner year's business were launched.

CONNECTICUT TRUCK FEES.

Connecticut proposes the following registration schedule for trucks: One-ton, \$25; 1½-ton, \$50; 2½-ton, \$80; three-ton, \$150; 3½-ton, \$200; four-ton, \$250; 4½-ton, \$450; over five-ton, \$150 a ton.

GOOD NEW ENGLAND ROADS.

Massachusetts is second in good roads, according to the ranking made recently by the American Road Builders' association. Rhode Island is first with a grade of 58.8 per cent., Massachusetts having 51.7 per cent.

WINTHER TRUCKS AT CHICAGO.

The Winther Motor Sales Corporation, Kenosha, Wis., exhibited trucks and passenger cars in a special display at the Sherman house during the national automobile show at Chicago.

The Mack Motors Co. and the Topeka Overland Co. merged this month at Topeka, Kan., under the former name.

50,000 TRAILERS NOW IN USE THROUGHOUT UNITED STATES

Reports from American consuls in all parts of the world show that this country is far in advance of all other countries in the use of trailers, notwithstanding England was first to adopt the principle of trailer transportation and there are about a score of trailer manufacturers in Europe, located in England, France, Italy and Germany.

The United States, with about 75 trailer makers and probably 50,000 trailers in use, leads the world in this new industry.

Use of trailers by the American, French, English and Italian armies during and after the war, and the subsequent sale of much of this equipment, helped to introduce trailers in France and Belgium, and it is expected a return to more normal exchange rates will open a good market for American makes. Trailers are being exported in limited numbers from this country to many parts of the world, including Canada, the West Indies, some South American countries, England, Scandinavia, West and South Africa, the Philippines and even China.

In the Liverpool district of England the demand for trailers has exceeded the supply. They are used chiefly by the large flour, sugar, cake and oil mills and by heavy haulage contractors and forwarding agents. Local firms forced to transport goods by highway because of adverse railroad shipping conditions have generally adopted trailers in conjunction with motor trucks.

About 300 trailers are used in the Marseilles district in France. They are heavy duty vehicles, of both two-wheel and four-wheel types, the former employed chiefly for carrying wine in casks, and the latter for hauling general merchandise.

There is considerable demand in Sweden for trailers for use with trucks of three, five and seven tons capacity, and the market is expected to be large in the future.

Even the little republic of Salvador in Central America has imported a few trailers. A two-ton truck and a two-ton trailer bought by a coffee planter displaced 160 oxen, 80 ox carts and 80 drivers. The value of the carts and oxen was about \$4800, and it cost about \$40 a day to feed the oxen, and an equal amount to pay the drivers. The truck and trailer, with one driver, make four trips a day and two at night over the 7½-mile road to the shipping point and haul 120,000 pounds of coffee in the 18 hours, or as much as the 80 ox carts did formerly in one day.

At all points the trailer has shown that it has come to stay and that it has all the qualities which make for economy and efficiency.

THE STOUGHTON 1-TON SPEED TRUCK

In announcing its production of a new type of truck of one-ton capacity to be known as the Stoughton Speed Truck, the Motor Truck Division of the Stoughton Wagon Co., Stoughton, Wis., undoubtedly has stepped into a field where it will meet with eminent success.

Although designed for a general utility vehicle, the new Stoughton model was built particularly for use in all kinds of speedy delivery service, and for the farm market.

An especially important feature of the Stoughton speed truck, which is governed at a speed of 30 miles an hour, is the careful embodiment of all the standards set in the construction of heavier trucks of this company. Throughout the entire mechanism and structure the new truck is vastly similar to the larger models, which gives this new model unusual stamina, power and dependability. Every wearing unit is oversized for the purpose of fortifying the truck against the harsh punishment to which a truck carrying heavy loads at high speed is subjected.

Distributors and dealers for the Stoughton products have expressed great pleasure over the advent of the new model in the Stoughton line and already, it is claimed, have under way a sales promotion campaign which is expected to introduce this model on a wide scale, especially in rural districts and in lines of industry where a smaller and faster truck is essential. A more intimate idea of the various features of the Stoughton speed truck may be obtained from the following specifications:

Engine: Waukesha BUX, four-cylinder, four-cycle, L-head type, having cylinders cast in pairs with separable heads, also cast in pairs. Three-journal crankshaft fitted with bronze backed babbit bearings of large size and cooled by means of centrifugal water pump and large fan mounted on front bracket of engine base extensions. The bore is $3\frac{3}{4}$ inches and stroke $5\frac{1}{4}$ inches.

S. A. E. Rating of 22.5 Horsepower.

The horsepower under the S. A. E. rating at 1000 foot piston speed is 22.5, while at 30 miles an hour the engine is capable of developing fully 30 per cent. greater horsepower.

The engine is mounted on a three-point suspension, a mounting being provided on top of timing gear case to which the cross member is attached, while extension arms on the flywheel case provide suspension at the rear.

Equipment includes standard units, such as Stromberg Model M carburetor, Eiseman high-tension waterproof magneto with impulse starter, radiator fin and tube type specially designed for the new model, fitted with removable tanks and special oval tubes, which lessen the danger of freezing.

The clutch is the well known Brown-Lipe multiple disc type, dry discs, very easy in action and lined with best frictioned material on the faces of the driven discs.

The gearset is also Brown-Lipe make and like the clutch in unit with the engine, while the gearset control consists of a long lever within easy reach of the operator in a conventional position in the center of floor boards.

Gear reduction in gearset is as follows: On low, four to one; on second, 1.68 to one; on third, one to one; on reverse, 4.35 to one.

Sheldon Worm Drive Axle.

Axles: Front, Sheldon I-beam equipped with Timken roller bearings; rear, Sheldon worm drive, Timken bearings with gear ratio of five to one on high.

The propeller shaft is in two sections, the front section consisting of a carbon steel shaft, heat treated, fitted at each end with flexible universal joints, while the rear section consists of a hollow steel tube also fitted with flexible universal joints. An S. K. F. self-aligning ball bearing is fitted to the propeller shaft amidship, which prevents whipping of the shaft.

Sheldon Springs.

Springs: Front, Sheldon heat treated, length 40 inches, width $2\frac{1}{4}$ inches, having eight leaves; rear, Sheldon heat treated, length 50 inches, width $2\frac{1}{2}$ inches, with nine leaves.

The frame is of pressed steel, having a channel of five inches and width of three inches.

Wood Wheels Used.

Wood wheels are used, equipped with demountable rims for cord pneumatic tires of ample size, 34 by $4\frac{1}{2}$ inch tires on front wheels and 35 by five in rear wheels.

The steering gear is a Levine worm and nut adjustable type. The gasoline tank under the driver's seat has 23 gallons capacity. The wheelbase is 130 inches, the chassis weight 3300 pounds, and the length of chassis overall is 15 feet, from seat to rear axle 60 inches and from seat to rear end frame 90 inches.

LUBRICATION AND ENGINE WEAR.

A booklet just issued by the Engineering Division, Automotive Department of the Vacuum Oil Co., 61 Broadway, New York city, deals in a masterly manner with the probable causes of oil troubles as viewed by the average layman and repairer and the actual reason for the causes as determined by the engineering division of the company.

The summary finds that the correct oil is the one which meets the conditions of operating temperatures and oil distribution and which provides a proper piston ring seal and in service leaves a minimum of carbon deposit. By its use wear is greatly minimized. Such an oil will be of a character to provide efficient lubrication under all operating conditions throughout the life of the car. When accumulated wear becomes excessive proper repairs alone will overcome its effects.

N. A. C. C. FARM TRUCK SURVEY.

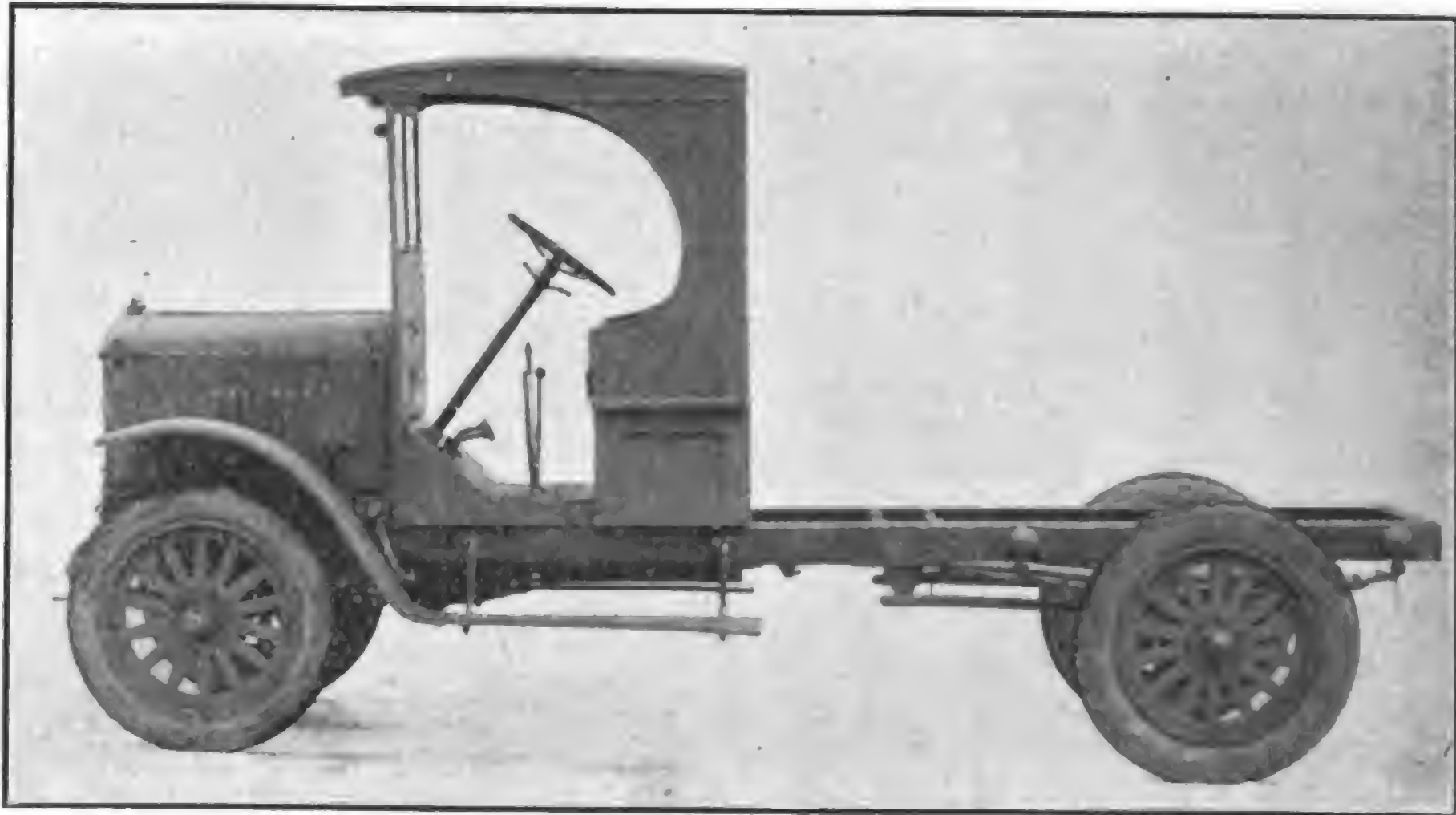
The motor truck committee of the National Automobile Chamber of Commerce, with the cooperation of departments of agriculture in all states, will make a survey of the use of motor vehicles on farms throughout the country.

58 TRUCKS AT MILWAUKEE.

At the Milwaukee automobile show, Jan. 17-23, there were 58 trucks on exhibition. Dump bodies and hoisting devices were demonstrated. Many of the trucks were shown in the finished state, just ready for delivery to customers.

W. H. E. TOTTEN DEAD.

The U. S. Motor Truck Co., Cincinnati, O., sustained a severe loss on Jan. 20 in the death of its secretary, W. H. E. Totten. He had long been prominent in the manufacturing field. Mr. Totten was 56 years of age.



Stoughton One-Ton Speed Truck, Designed for Fast Delivery Service and the Farm Market.

NOTES THAT SHOULD CHEER INDUSTRY

PIERCE-ARROW EARNINGS.

The Pierce-Arrow Motor Car Co. has issued its annual report for the year ended Dec. 31, 1920, showing net profits, after charges and federal taxes of \$1,769,914, equivalent, after deduction of preferred dividends, to \$3.88 a share on the 250,000 shares of capital stock of no par value. This compares with net profits of \$2,491,070, or \$6.75 a share in the previous year.

President Mixer says in part: "Business during first half of the year was active and operating conditions were difficult. In common with other industries, the last half of the year showed a marked reduction in demand for both cars and trucks. During this period a substantial rearrangement of plant, to provide improved manufacturing conditions, was accomplished. Where needed, machine tool equipment was modernized and processes revised for both quality and economy. This revision is practically complete. No new buildings were constructed. The plan has been fully maintained. For current depreciation \$567,676 has been taken out of earnings. Book value of common stock shown by balance sheet is \$39.49 a share. Rearrangement of plant, to fit it for resumption of normal activities, after three years devoted to war purposes, has been completed, and the company finds itself in better position than ever before."

DORRIS EXPANSION.

Webster Colburn of the Dorris Motor Car Co., St. Louis, announces that L. H. Amrine has connected himself with the truck sales department of the Dorris company in an important capacity. It is the purpose of the Dorris Motor Car Co. to extend its production of trucks and their sale very materially, and it is to have a hand in this expansion that Mr. Amrine has connected himself with the company.

GOOD DART BUSINESS.

Reports presented at the annual meeting of the Dart Truck & Tractor Corporation, Waterloo, Ia., presage a splendid business for 1921. The following officers were elected: President, C. C. Wolf; first vice president, W. H. Johnson, in charge of engineering; second vice president, M. D. Herron, in charge of sales; secretary and treasurer, G. J. Bondurant; directors, Messrs. Wolf, Johnson and Herron, S. Y. Eggert, E. L. Stover, William Galloway and H. W. Hileman.

GOOD YEAR FOR UNION.

The Union Motor Truck Co., Bay City, Mich., reports a good year in 1920, there being a surplus over all liabilities after charges and dividends were paid.



C. W. Nash, President of the Nash Motors Co.

STRONG NASH STANDING.

Nash Motors Co. sales for last year amounted to more than \$57,000,000, about \$10,000,000 over the figures for 1919. The company produced 37,263 passenger cars and 3846 trucks. A total of 2700 cars and trucks were exported to countries other than Canada and Mexico. The profit and loss surplus at the end of the year was \$12,531,837.

ORDER FOR 375 WINTHERS.

An order for 300 1½-ton and 75 Winther three-ton trucks has been received from the government. As a result the Winther Motor Co., the Marwin Truck Corporation and the Kenosha Wheel & Axle Co., affiliated corporations at Kenosha, Wis., are getting ready to begin production on a maximum scale. All of the trucks will be of the quadruple drive type.

FULL GMC PRODUCTION SOON.

The General Motors Truck Co. is running its Pontiac, Mich., plant at better than half time and expects to go into production on all of its five models next month.

BIG DUPLEX BUSINESS.

An unusual influx of business during January was reported at the annual meeting of the Duplex Truck Co., Lansing, Mich. Bert S. Gier and Charles W. Nichols were added to the board of directors.

PALMER CAPITAL DOUBLED.

Palmer Brothers, Cos Cob, Greenwich, Conn., manufacturers of gasoline engines, etc., has increased their capital from \$250,000 to \$500,000.

RECOGNITION FOR MOTOR BUS.

The motor bus in highway passenger service, as a means of establishing closer trade relations between city and country, has been recognized by the business men of Maryland and the District of Columbia, in a special trip, taken through Southern Maryland. Governor Ritchie was a member of the party and made an address at Surrattsville in which he urged a greater use of the public highway and motor vehicle as a means of stimulating trade and better social conditions in community life in Maryland.

The trip as a highway passenger demonstration was a complete success, and left a deep impression upon the populace as to the real significance of the motor vehicle—both freight and passenger—in its relation to farms and towns along the way.

Included in the party were more than 150 business men from Washington, D. C.

MILD WINTER WEATHER KEEPS TRUCKS IN ACTION.

The Travel and Transport Bureau of the B. F. Goodrich Co. has made a survey of gasoline consumption which indicates that, due to the unusually mild weather, 3,000,000 more cars and trucks are in use this winter than last. The reports show that gasoline consumption this winter in northern states is at least 150 per cent. greater than last year, many cities showing increases ranging as high as 400 or 500 per cent.

The largest gains in gasoline consumption were shown by cities in northern Michigan and in states along the Canadian border which usually are snowbound from fall to spring. No section of the country reported an increase of less than 90 per cent.

CONTINENTAL MOTORS EARNINGS.

The net profits of the Continental Motors Corporation during the fiscal year ending Oct. 31, 1920, were \$3,567,504, compared with \$3,425,725 in 1919. Including the surplus, the balance was \$7,395,202, compared with \$4,981,335 the year before. After deducting dividends the net surplus was \$6,345,309, as against \$3,827,698 the year before. The total sales were 15½ per cent. in excess of the previous year. The orders on the book at close of the fiscal year totaled \$53,584,220, or 64 per cent. more than at the end of the previous year.

SERVICE CANADIAN PLANT READY IN THE SPRING.

The Service Motor Truck Co., Wabash, Ind., has purchased 50 acres of land in London, Ont., and is planning to build a plant for truck manufacturing at that point in the spring.

LISTENING ROD FINDS ENGINE KNOCKS

PROBABLY the most difficult problem that confronts the operator of a motor truck is that of distinguishing between the different knocks that occur in his engine and determining where the knock is actually located and fixing the cause.

Several devices are marketed through jobbers and accessory houses that are claimed to facilitate locating knocks in the engine, but experience is, as always, the best teacher, and it will enable one to locate and repair the faulty part before it develops into more serious trouble.

The more experienced an operator is in listening to the "talk of an engine," the more expert he will become in discovering and being able to tell exactly what is loose. Each part not functioning properly has a peculiar sound, which usually comes at regular periods according to the speed of the engine.

A loose connecting rod produces a sharp bump or a very heavy, hollow sound. To definitely locate, run the engine slowly and cut out the cylinders one by one. If a rod happens to be very loose the knocks can be detected by revolving the engine with the hand crank. This trouble is caused by loose, scored or burned-out bearing.

Main Bearing Knocks.

Main bearing knocks are readily located by running the engine on two cylinders at a time, one on each side of the crank bearing. A hard bump will be noticeable throughout the engine, produced regularly with the firing of the two cylinders. Such knocks are caused by end play on the shaft, loose fitting bearings, or scored or burnt bearings. In the two last instances the engine will usually groan when it is started cold.

A loose piston pin is distinguished by a sharp metallic knock. It can be located by using the "listening rod" upon each cylinder and speeding up the engine suddenly, then closing the throttle quickly. By so doing a double knock is heard which is very sharp and which might better be called a "rap." These knocks are caused by a crooked or broken pin, or perhaps a tight or badly worn member.

A loose crankshaft is seldom encountered. It gives a rattling slap combined with a thud. In some cases only the thud is audible. In other cases the looseness of the bearings will allow the gears to slap and rattle. Generally this trouble is very hard to discover. It can be located, however, by sounding the gear case and camshaft bearings with the "listening apparatus." The knocks are caused by loose bearings, end play or badly fitted bearings.

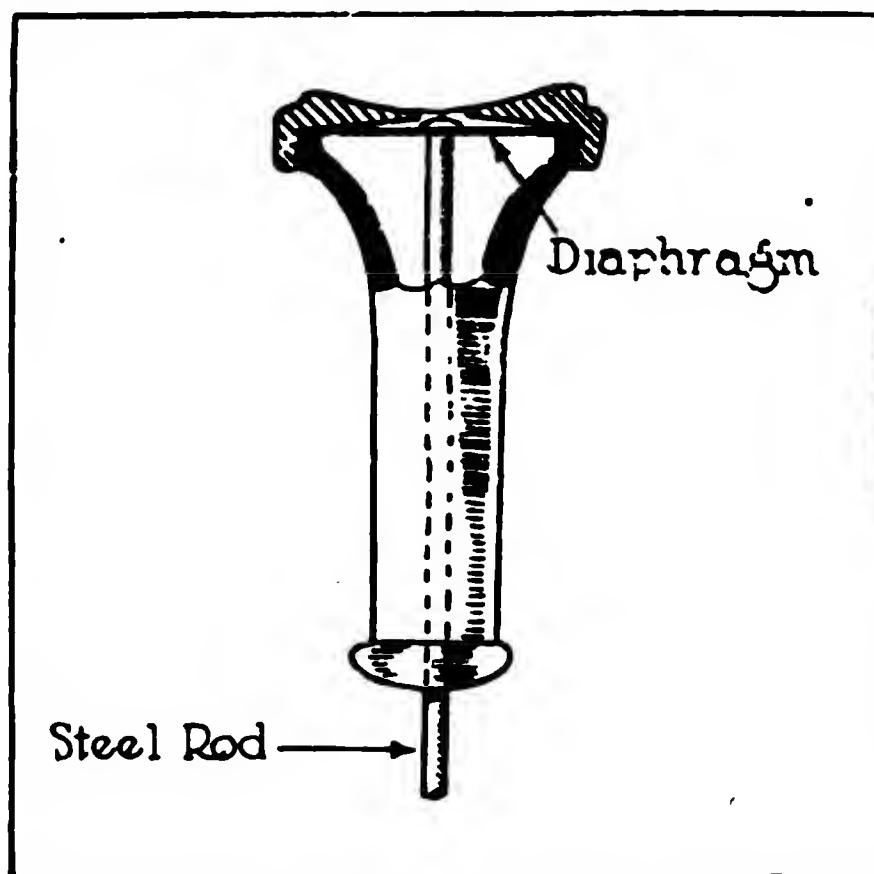
Loose Flywheel.

A loose flywheel will produce a heavy knock at low engine speed at regular intervals. The knock will change its nature entirely when the engine is speeded up, and the vibration of the shaft will produce a dull, chattering knock. It is located by disengaging the clutch and

rocking the flywheel back and forth. The trouble is caused by improper fitting, loose bolts, broken bolts or poor keys.

A loose piston gives a very short knock similar to valve slap, the clearness of it varying with the size of the cylinder and metal used in the piston. It can be located very easily by the use of the "listening rod" held against the cylinder wall. It is caused by a large bore, small piston or eccentric member.

Loose valve tappets will produce a brisk tap or knock very often encountered and difficult to remedy on a high speed engine. The trouble is caused by an excessive clearance, bent or sticking valve stems, flat or out of round rollers, bent valve springs, a seat that is not square or a combination of these causes.



Listening Rod Made from Telephone Receiver and Steel Rod Used for Locating Engine Knocks.

NO SALE OF ARMY TRUCKS.

The attempt to dump 20,000 or more army trucks on the market, fostered by Congressman Anthony of Kansas, appears to have come a cropper. Military authorities offered strenuous opposition.

WHITE AGENCY IN READING.

The White Co. has appointed Corbin Bros. as White distributor at Reading, Pa. A modern service station will be maintained.

GASOLINE AND OIL CUT.

The Sinclair Refining Co. announced on Jan. 31 the second reduction within a month on gasoline and kerosene. Gasoline at filling stations is now 25 cents a gallon and tank wagon deliveries, 23 cents.

The Standard Oil Co. of Indiana also announced a price reduction of two cents a gallon on gasoline, bringing the price at filling stations down to 25 cents. This reduction is effective in the mid-West territory.

The Magnolia Petroleum Co. has cut the price of crude oil 50 cents a barrel. New prices quoted by the company on various crudes range from \$1 to \$2.50 a barrel. The Prairie Oil & Gas Co. has made a similar cut on crude oil.

The principal oil purchasing agencies of Pittsburgh have also announced a cut in the price of crude oil. Pennsylvania crude was cut 50 cents, bringing the price to \$5 a barrel. Cabell was reduced to \$3.71; Somerset light to \$3.75; Somerset to \$3.50 and Ragland to \$1.75, a reduction of 25 cents a barrel.

POLISH RED CROSS USES YANKEE TRUCK.

A three-ton White truck has just been donated to the Polish Red Cross by the American Red Cross for use in its warehouse in the Warsaw district.

This gift is a veritable God-send to the Poles because it is the finest piece of rolling stock in that society's relief work. Complete efficiency records are being kept on the operation of this automobile under Polish management, and these records will be compared with similar ones made on trucks operated by American relief organizations in Warsaw. There is a great deal of friendly rivalry between the auto experts—each side wanting to show the best results.

The Gaines Motor Co., Wichita Falls, Tex., has opened a branch office at Graham for the distribution of Republic trucks.



White Three-Ton Truck, the Gift of the American Red Cross to Polish Red Cross.

WHO'S WHO ON SALES FIRING LINE

BIG INDIANA DISTRIBUTOR.

The Consolidated Garage and Sales Co., 928 North Pennsylvania street, Indianapolis, Ind., has been awarded the distribution rights for the Indiana truck, manufactured by the Indiana Truck Corporation, Marion, Ind. The company will carry a full line of vehicles, in addition to all parts, and will also maintain a modern service station. R. M. Beck, district sales manager for the Marion concern, has resigned to accept the post of vice president and sales manager for the Indianapolis organization. E. M. Harlan is president and F. W. Beck secretary and treasurer of the latter company.

DIAMOND T ST. LOUIS PLANS.

The distribution of Diamond T trucks throughout the St. Louis territory has been taken over by a new organization formed for that purpose, and it will be known as the Diamond T Motor Truck Co. of St. Louis. Joseph M. Grossmann, who for some time has been connected with the automobile business in St. Louis, will be in active charge of the new concern. A temporary location has been secured at 3327 Locust street. Arrangements are pending for the erection of a building centrally located as a permanent home.

TO SELL CONTINENTAL PARTS.

The Frank and Weinberger Parts Co., New Orleans, has been appointed distributor in Louisiana and Southern Mississippi for all the automobile parts manufactured by the Continental Motors Corporation, Detroit.



F. B. Willis, Named Sales Manager for Duplex Truck Co., as Announced in January Motor Truck. An Originator of the Vocational Method of Selling Truck Transportation.



"Never put a bet down for place or show. Always play to win," says O. M. Vett. "The place horse and the show horse are also-rans."

The veteran truck salesman was full of fire as he spoke.

"I sat with a salesman at a distributor's salesroom the other day," he went on in elaboration of his philosophy.

"A stranger came and remarked: 'I see you have one of your used two-ton trucks for sale.'"

"'I'll be back in a minute,' says the salesman to me, and he was. He never expected to make the sale and he didn't."

"Had he gone at the thing with enthusiasm he might have put it over. At least it would have cost him no more to go through the motions of showing his prospect the truck, with a take-it-or-leave-it air. He was beaten before he started."

"Confidence is the keynote of success. Watch how business picks up when the manufacturer and consumer begins to show confidence in the coming administration. Industry will be humming in no time. The mills will get going on high even if conditions do not warrant it. The factory man feels that a change in the control of national affairs is going to help him and he will show his confidence by speeding up production and getting down to brass tacks right off the reel. It's all confidence."

"Same thing in selling trucks. If my salesman friend had realized that a man who came in inquiring about a two-ton truck in which a newspaper advertisement had already awakened his interest was a mighty good prospect and was in the truck buying mood he could have closed his man on the spot."

"But no, he felt that he was not going to make the sale and went into the game under a big handicap. He was back in a minute, all right, but if he had spent two or three minutes—which he could have well spared—in hypnotizing his prospect with the right kind of selling talk, he might have had a fat day's pay and be none the worse for wear."

"You sell when you think you're going to and the 'back in a minute' salesman ought to go back to the mines."

The Traffic Motor Truck Corporation, St. Louis, Mo., has appointed Warren W. Roman, Penns Grove, N. J., as distributor for Salem county.

REPUBLIC GETS THRONE.

Col. Frank E. Smith, first vice president and general manager of the Republic Motor Truck Co., Inc., Alma, Mich., has announced the appointment of Daniel G. Throne as national sales representative for Republic Truck Sales Corporation.

Mr. Throne joins the Republic organization with an enviable reputation for success in selling national installation of diversified products, including fabricated steel, hardware and motor truck equipment, among the country's largest and best known national buyers.

Mr. Throne's business connection immediately prior to joining Republic was with the Diamond T Motor Car Co. of Chicago, where, for over a year, he was eminently successful as district manager, and covered an extensive territory embracing Michigan, Ohio, Indiana and Western New York, under the direction of A. J. Whipple, then general sales manager of Diamond T.

In the appointment of Mr. Throne as national sales representative for Republic trucks, Mr. Whipple, the company's general sales manager, secures for his organization a valuable aide, whose experience in national installation sales will help materially toward assuring success of Republic's plans for expansion in that branch of the selling field.

H. M. DANIELS MANAGER OF NEW YORK FWD BRANCH.

The Four Wheel Drive Co., Clintonville, Wis., has appointed H. M. Daniels manager of its New York branch. Mr. Daniels recently returned from abroad, where he established FWD agencies in China, Japan, India and other countries.



H. M. Daniels, Newly Appointed Manager of New York FWD Branch.

THE AKRON 1-TON MULTI-TRUCK

THE Akron Multi-Truck, the product of the Thomart Motor Co., Akron, O., takes its name from its multiplied usefulness. It is a speed truck and a sturdy, one-ton load carrier concentrated into one model, equipped with Thomart exclusive spring suspension, which is claimed to be a distinct engineering feature, making possible the multi-purpose principle for which this truck is accentuated.

Under light loads a primary set of long, flexible, semi-elliptic springs, claimed to be as resilient as passenger car springs, permit a speed of 30 to 35 miles an hour without the slightest rocking effect perceptible. When heavier loads are carried a secondary set of auxiliary springs, quarter-elliptic, come automatically into play proportionally with the load. This feature allows the driver to deliver a heavy load perhaps a distance of 10 to 30 miles at a conservative speed, returning safely when empty at a speed ranging from 30 to 35 miles per hour.

The Power Plant.

Inspection of the Akron Multi-Truck power plant reveals an engine of ample size, embodying many later type engineering principles that have proved successful in heavy duty types. The engine is suspended at three points to prevent torsional strains of the chassis affecting its alignment with the driving members. The front support is a trunnion, having an unusual large bearing surface, five inches, provided with Alemite lubricator to insure freedom of oscillation. The bearing is fastened to the cross member of the frame with two steel bolts. The rear supports consist of extension arms from the flywheel casing, which are fastened by stud bolts to the side frame.

The engine is a four-cylinder four-cycle, L-head, separable head type; bore, four inches and stroke of $5\frac{1}{2}$ inches, with piston displacement of 257.6 cubic inches, and horsepower under S. A. E. rating of 25.6. At 1200 to 1400 revolutions on dynamometer test this horsepower is increased fully 30 per cent.

Unit power plant design is used in the engine, the cylinders cast in pairs, separable heads, two in number, being also cast in pairs.

Tappets are roller type working on hardened steel pins, fitting bronze guides, which may be renewed easily when worn. Adjustment of the tappets is by means of an adjusting screw at the top fitted with lock nut. Valves are of ample size, $1\frac{1}{4}$ inches in diameter, the stems operating in renewable guides and fitted with barrel type springs, which exert a uniform tension on the valves.

Crankshaft and Reciprocating Parts.

The crankshaft is three-journal type, drop forged from special alloy steel, heat treated, ground to size and cast with a flange integral at the rear to which the flywheel is bolted, operating in three main babbitt lined, bronze backed bearings held in removable caps. Crank-

shaft thrust is taken by the center bearing and the shaft is drilled to permit of oil pressure feed to the crankpin bearings. The crankshaft is designed to be perfectly balanced under all speeds and all loads.

The camshaft is a drop forging made from carbon steel, case hardened and ground, with cams integral, fitted with a helical cut gear at rear end, which operates oil pump and having a flange cast integral at the forward end to which the timing gear of the timing gearset is bolted.

The piston is made of cast iron fitted with three rings and reinforced with webs inside, while the wristpin is steel tubing ground to size, fitted with bronze bushing and held in the piston bosses by a two-diameter set screw, which passes through the tube and into the inner boss.

The connecting rod is a forging of carbon steel of special analysis, heat treated, drilled the entire length to supply pressure lubrication from the crankpin to the wristpin. Connecting rod bearings are held in place by four $\frac{1}{2}$ -inch alloy steel bolts.

Crankcase in Two Sections.

The crankcase is in two sections, upper and lower. The upper section has the cylinders bolted to it by 26 alloy steel studs. The main bearings are supported by ribs which extend downward from the sides and support the camshaft bearings from a center rib. The lower section is shallow at the forward end to afford axle clearance, and the rear end is deep to form a reservoir for the oiling system. Both sections have forward extensions, forming the housing for the timing gearset, and rear extensions forming the bell housing for the flywheel and to which the housing of the clutch is fastened.

The timing gearset consists of a train

of five gears, unusually wide of face, helical cut, oiled by pressure feed, driving the camshaft water pump and generator. The crankshaft, generator and pump gears are made of heat treated carbon steel. The idler and camshaft gears are made of semi-steel. End thrust is cared for by large steel plungers and springs acting against a hardened steel plate secured to gear case cover.

The Preheating Manifold.

The form of the exhaust manifold is conventional, except that at the center is a rectangular opening. The intake ports are below the level of the exhaust ports, so that the intake flanges can be attached and the intake manifold come out and up with an easy sweep. Where the manifolds join there is a rectangular face on the intake, which seats into the opening in the exhaust manifold, and the intake manifold at this point is formed to have a box shape. The two manifolds are bolted together with a gasket at the joint. When the engine is operating the exhaust gases play upon the inner face of the box seated in the exhaust manifold, heating the incoming fresh gas, causing it to be more volatile and to ignite more quickly in the engine cylinders. This feature allows the use of low grade fuels, causing the engine to develop its rated horsepower even under adverse fuel conditions.

Lubricating and Cooling System.

The lubrication is a pressure system. The oil pump, which is located at the extreme rear of the reservoir, is a vertical type, driven by a helical gear on the end of camshaft. The base of the crank chamber over the oil chamber is a cast steel plate, provided with an overflow in the center, through which the oil returns to the reservoir after use in the bearings. The oil pump chamber is surrounded by a screen which separates sediment



Sturdy Akron Multi-Truck, Which Has Distinct Engineering Features.

from the oil before it reaches the pump. The oil which returns from the steel plate through the overflow passes through a screen before entering the reservoir. The center of the screened portion forms a trap for sediment, which is easily removed from underneath.

Cooling is by means of a centrifugal water pump at the side of the engine and an 18-inch fan mounted on a bracket on the forward extension of the crankcase, running on a roller bearing. Radiator is of ample size, honeycomb type, and is fitted to the cross frame member by means of two hot riveted brackets, one at each side. Statement is made that this method of fastening the radiator is original with the company and that frame stresses are eliminated.

Other Components.

The clutch and gearset form a unit with the engine. The clutch consists of 15 dry disc plates, seven discs driving and eight driven faced with frictioned material.

The gearset is located in the rear of the clutch, separated from it by a partition in the housing and is provided with three speeds forward and one reverse. All gears are of ample size. The main shaft turns on large diameter ball bearings and the counter shaft on roller bearings. Speeds are selective and controlled by long lever conveniently located for the driver.

The propeller shaft is in two sections, the forward end made of heat treated nickel steel, the rear section of cold drawn seamless steel tubing. Whipping of the shaft is prevented by a floating type ball bearing fastened to the middle cross member of the frame just forward of the center universal joint. Universal joints are three in number and consist of three fabric discs. The ends of the propeller shaft terminate in flexible type couplings, between which the discs are clamped by small steel bolts, castle nuts and cotters.

Engine and rear axle are inclined so that at normal loads a straight line drive is achieved. This feature eliminates continuous wear of the universal joints, which usually exists where there is angularity in the propeller shaft installation.

The rear axle is a semi-floating spiral bevel drive type. Gears are alloy steel,

heat treated and individually mated for silent operation. Adjustable taper roller bearings of extra large dimensions are used throughout. Axle housing is of pressed steel, fitted with large cover in rear for adjustment of bearings or disassembling gears. Hotchkiss drive is used, which further cushions the final application of power at the wheels. The final gear ratio is $5\frac{1}{2}$ to one.

The front axle is a drop forged carbon steel I beam section, correctly tilted to give castor action to steering and two adjustable taper roller bearings are fitted in each wheel hub.

Irreversible Steering Gear.

The steering gear is the well known irreversible type, connected through large size linkage to ball joints and tie rod to the wheels. Springs and adjustable cups provide suitable cushioning effect at each end of the linkage, eliminating road shocks at the steering wheel when under load.

Both service and emergency brakes are internal expanding in fully enclosed drums bolted to the rear wheel hubs. They are 16 inches in diameter and $1\frac{1}{4}$ inches wide. Brake linkage is a specially designed type, fitted with equalizing device which exerts equal pressure at each brake shoe.

The spark and throttle are manually controlled by levers operated in quadrant on upper side of steering wheel, while an independent accelerator is fitted at the floor, which allows foot operation of the throttle of the engine if desired.

All external lubrication of slow moving bearings is accomplished by Alemite pressure system, forcing the lubricant into the bearing surfaces under 500 pounds pressure to the square inch.

Springs and Wheels.

Front and rear springs are semi-elliptic, supplemented by special $\frac{1}{4}$ -inch elliptical auxiliary springs, front and rear, which come into action when the truck is heavily loaded. All shackle pins are of case hardened, heat treated carbon steel, ground to size to fit special bronze bushings in spring ends.

Wheels are of wood construction fitted for demountable rims and 34 by five-inch cord pneumatic tires, front and rear.

The tread is 56 inches and the wheel-base $133\frac{1}{2}$ inches.

The equipment includes electric head and tail lamps, instrument board illuminated with dash lamp, speedometer and full kit of tools, and tire pump attachment to power take off on gearset.

The electric equipment consists of Westinghouse two-unit starting and lighting system. The starting motor and generator are mounted on the engine in a manner which makes them an integral unit with the engine assembly, insuring accurate alignment.

Distribution Policies.

The Thomart company is adopting a new distribution policy which is original and is proving of great benefit to the individual dealer who sells the Akron Multi-Truck. The policy consists of three features, namely: First, one model standardization; second, one-year guarantee, and third, a radical new service basis between manufacturer and dealer.

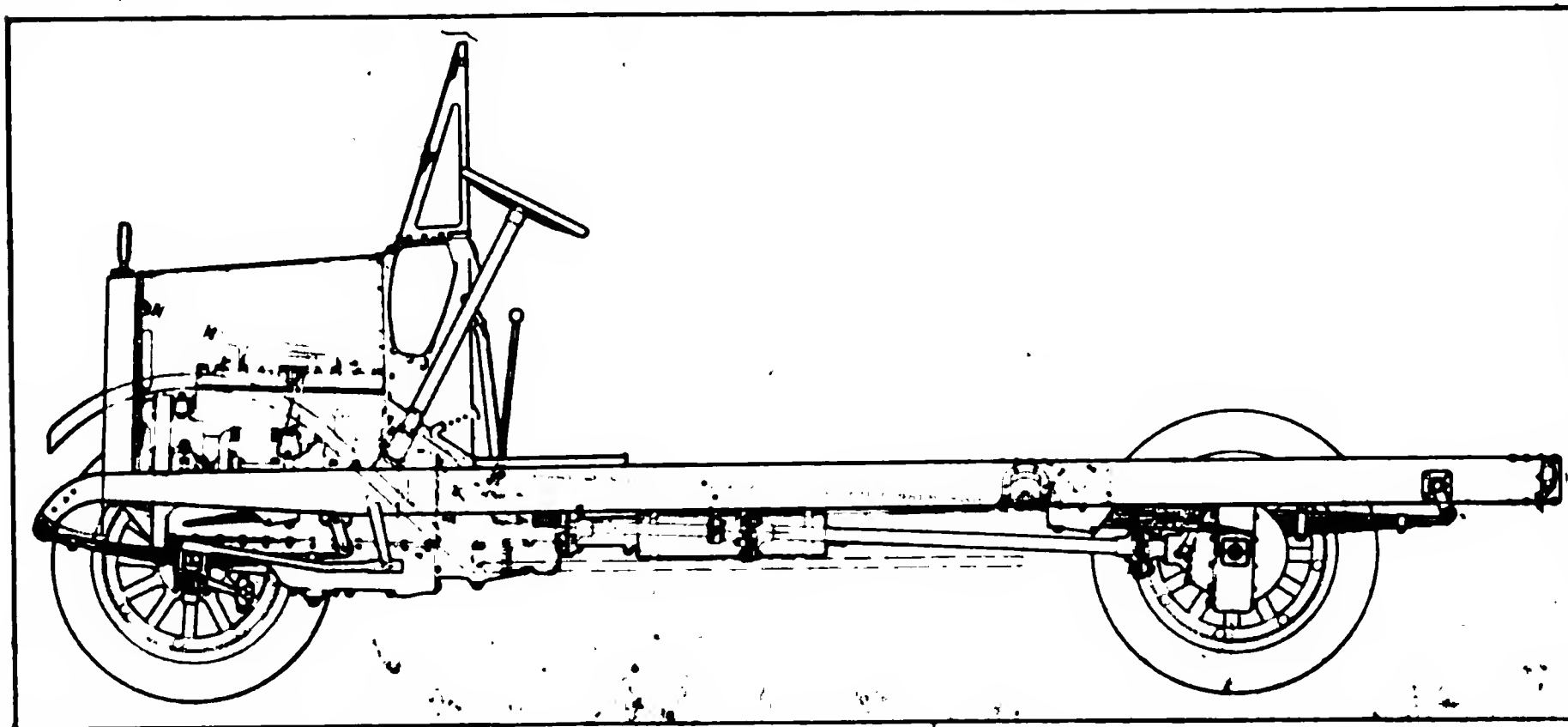
In line with the first feature, the company states that one model standardization eliminates the heavy burden of capital required where a line consists of two or more models for display, demonstration, service and parts. With overhead notably lowered the dealer is given a wider working margin in which to operate an efficient, prompt and dependable service department.

The second feature shows the faith that the company has in its product, while the third contemplates means whereby the dealer will be provided with a working margin which will enable him to operate an efficient, prompt and dependable service department.

Into each contract with a distributor is written a very definite clause binding the distributor to agree that he and his dealers shall at all times maintain the complete Thomart "Unit-Replacement Service."

To make this possible the Thomart company has drawn up a service policy whereby the dealer participates in a cash bonus over and above the trade discounts which constitutes the manufacturer's portion of the service obligation. In so doing the Thomart company realizes that this establishes an entirely new precedent, but believes so strongly in the necessity for organized, and, as far as possible, standardized service that it is prepared to ignore precedent in an endeavor to establish new ideals and make practical their application.

In the storage battery field, "replacement service" has long been a standard practise. To the average truck dealer with his range of four or seven models it has been very nearly a physical and financial impossibility to stock continuously all parts required for each and every model or to carry a complete range of extra cars to be sent into customers' service in the event that serious accident requires more than simple replacements. With this single model Akron Multi-Truck, it is claimed, both emergency truck service and unit replacement of parts are definite and wholly practical policies which result in a notably higher yearly service mileage to the Akron Multi-Truck owners.



Mechanical View New Akron Multi-Truck—Note Straight Line Drive from Engine to Rear Axle; Also Front and Rear Auxiliary Springs.

NOW IS THE TIME TO SELL

(By J. F. JONES, Manager Domestic Sales, International Harvester Co., in Harvester World.)

THIRTY minutes after the armistice was signed there was a general uprising of prophets who predicted that the bottom would fall out of everything immediately. It has been two years now and we are still in business, doing our best to serve our dealers and customers. We are just finishing a fairly satisfactory year, we are at this moment delivering seasonable goods, and we are looking forward to 1921 for an even greater year of successful effort from every man in the organization.

There are again plenty of prophets who say business is going to ruin and that all kinds of bad conditions are going to keep us from doing our duty and performing our service. We believe they are false prophets and that no real business men will listen to them. We believe pessimism was never made welcome for very long by the true salesman or merchant and that the present is not going to offer an exception.

A Real Business Man.

We were recently reliably informed of an implement manufacturer who had received a number of cancellations from such of his dealers as had been stampeded by the predictions of the false prophets. They had all sent in letters full of pessimism saying they could not take the goods they had ordered because they did not think they could ever sell them. This implement maker at the time had orders in with the steel companies for hundreds of thousands of dollars worth of materials which he could have cancelled or suspended because of the cancellations he had received. But being a real business man, able to see beyond the present moment, he would not even consider doing this. He wrote his dealers and jobbers telling them he was not going to accept their cancellations, but that in their interest as well as his own, he was going to hold their letters in abeyance for the time being, knowing very well that by next spring they would want every machine they had ordered. He told them he was going ahead and manufacture the machines and do his best to have them ready by the time he knew they would be wanted.

We were not told who this man was, but we compliment him, and we compliment everyone in the trade who has foresight enough to take the same view of the situation and go ahead making good on our responsibility to the farmer and to the world. There never has been and never will be a permanent depression so long as the farmer has good crops. And every man in the implement industry must remember that the growing of crops and the feed of the world must go on, has to go on, at an even pace. We are dealing with essentials and we have to go ahead no matter what anyone says or prophesies to the contrary.

Building for the Future.

Every individual member of the International Harvester organization, especially of the sales department and dealer organization, should know of an experience this summer of a large company which manufacturers phonographs, records and music. This company along in May faced a market condition which experts in the trade and all its competitors said was fatal. Everybody said the business in that company's line was dead, that the people had stopped buying, and that nothing could be done that would make them buy these commodities. But the man in charge of this company's business refused to believe such reports. While other people were believing them he took no stock in them at all. In fact, this company's wholesales organization made themselves over completely, took on an entirely new lease of energy and enthusiasm, and waded into the market stagnation to sell goods. The results were that this sales organization doubled their company's business over anything it had ever had before, good times or bad. And, furthermore, this sales and dealer organization brought their company up from a poor second in its industry to a good first, so that now it is the leader in its field.

Go Out and Find Them.

We never did and never will believe in selling a man something he doesn't want and doesn't need; we do not believe this is the purpose of salesmanship. But the customers of that phonograph company are today getting enjoyment and profit out of the instruments they bought during the time when the prophets said they would not buy.

And our industry is even more essential and vital to the happiness and welfare of the people. We can afford to do only one thing today—go out and find all the people in every territory who need our goods and sell them what they want.

We do not believe it would be possible to hire enough salesmen to continue to sell something which the people do not need or want, but we do believe that there never was a time when conditions were so tight that a real business man with a clear insight into the needs and possibilities of the hour could not sell the people what they need. It is just as essential to the prosperity of the country that every acre of land be cultivated during 1921 as during 1918-19-20, or any other year, and it is just as much more profitable in proportion now as ever for the farmer to use the proper equipment for conserving his soil and increasing his yield. Regardless of the momentary depression, we believe the far-sighted merchant is the one who pursues his even course and as usual puts himself in a position to serve his trade and his community.

The management of this company is going to expect of every man on the pay

roll the realization of our opportunity. We are going to expect an effort worthy of the situation.

M. & A. M. A. COMMITTEES.

The following committees have been appointed from the board of directors of the M. & A. M. A. for coming year:

Executive Committee.

E. H. Broadwell, chairman, Fisk Rubber Co., Chicopee Falls, Mass.

C. E. Thompson, Steel Products Co., Cleveland, O.

E. P. Hammond, Gemmer Manufacturing Co., Detroit, Mich.

W. O. Rutherford, B. F. Goodrich Co., Akron, O.

G. Brewer Griffin, Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

A. W. Copland, Detroit Gear & Machine Co., Detroit, Mich.

J. M. McComb, Crucible Steel Co. of America, Pittsburgh, Pa.

Finance Committee.

E. H. Broadwell, chairman, Fisk Rubber Co., Chicopee Falls, Mass.

C. E. Thompson, Steel Products Co., Cleveland, O.

E. P. Hammond, Gemmer Manufacturing Co., Detroit, Mich.

W. O. Rutherford, B. F. Goodrich Co., Akron, O.

G. Brewer Griffin, Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

J. M. McComb, Crucible Steel Co. of America, Pittsburgh, Pa.

Show and Allotment Committee.

W. O. Rutherford, chairman, B. F. Goodrich Co., Akron, O.

G. Brewer Griffin, Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

C. H. L. Flintermann, Detroit Pressed Steel Co., Detroit, Mich.

Banquet Committee.

J. M. McComb, chairman, Crucible Steel Co. of America, Pittsburgh, Pa.

E. P. Hammond, Gemmer Manufacturing Co., Detroit, Mich.

H. L. Horning, Waukesha Motor Co., Waukesha, Wis.

C. H. L. Flintermann, Detroit Pressed Steel Co., Detroit, Mich.

W. O. Rutherford, B. F. Goodrich Co., Akron, O.

Membership Committee.

A. W. Copland, chairman, Detroit Gear and Machine Co., Detroit, Mich.

G. W. Yeoman, Continental Motors Corporation, Detroit, Mich.

Fred Glover, Timken-Detroit Axle Co., Detroit, Mich.

CHANGE IN PAIGE AGENCY.

The retail agency for Paige cars and trucks at Dallas, Tex., has been taken over by the Texas-Paige company, distributors for most of Texas, from the Paige-Edwards company. Frank M. Edwards retains his interest in the retail business and will be retail sales manager. Location, 2504-8 Commerce street.

STAYNEW SELF-CLEANING AIR FILTER

A new device which is receiving favorable comment wherever shown is the Staynew Self-Cleaning Air Filter, manufactured by the Staynew Filter Co., Rochester, N. Y.

Many devices have been developed for the purpose of separating dust from air drawn into the carburetor at the air intake, especially for use with tractor engines. Tractor engines usually work under conditions where large quantities of dust are present in the air and if it were not for some form of dust separator attached to the engine carburetor air intake, which is capable of separating the dust from the air, untold damage would result to the parts of the engine which come into direct contact, such as engine bearings, pistons, rings, cylinders, etc.

Lubrication supplied to these working parts would naturally gather dust in such quantities that abrasive action would result, causing unnecessary wear of parts. It is the duty of the dust filter to separate the dust from the air and prevent this action from taking place. Such devices have usually been attached to tractors only, but the Staynew Filter company has advanced the idea a step further and developed a device which is applicable to the truck or tractor engine carburetor air intake.

Commercial vehicles are called upon nowadays to cover long distances under all kinds of road conditions, both good and bad, and the possibility of dust entering the interior of the engine through the carburetor intake and cutting the wearing surfaces of the working parts by abrasive action is just as great as in the case of a tractor engine.

For truck use the air filter is fastened by flanges, soldered to the filter cylinder and screwed to the dash. A flexible metal tubing connecting it with the air intake of the carburetor is fastened by a clamp, or it may be applied to a tractor by fastening in a similar manner to some up-right unit.

Principle of Operation.

Scientists have shown mathematically

and experiments have proved that the carrying capacity of a current of air as regards the weight of the particles carried varies directly as the sixth power of the velocity.

According to this law, if one assumes that a current of air with a velocity of 150 feet a second could carry along a particle of sand weighing one grain, if the velocity were reduced to 15 feet a second, it could carry along a particle of sand weighing only one-millionth of a grain.

This filter, it is claimed, is designed in accordance with this law and its greatest efficiency is due to the fact that the velocity of the air as it enters the filter shell is greatly reduced so that the larger particles of solid matter in the air are precipitated before entering the shell, also after the air enters the filter shell its velocity is further reduced to about 1/10 of the velocity with which it enters the shell. In the vertical pockets within the shell still further precipitation takes place, so that only the very finest particles are carried to the filtering material and as the air passes through the filtering material at less than one foot a second, it is thoroughly freed from all dust, sand, grit and other solid and abrasive matter.

Protects Wide Area.

The effective filtering area of the Staynew Self-Cleaning Air Filter is over 500 square inches, which is over 200 times the area of the largest carburetor air intake, so that the intake velocity of the air to the filtering surface is only 1/200 part of the velocity of the intake to the carburetor. The velocity being so greatly reduced, the dust, sand, grit, etc., is separated from the air mostly by gravity.

The air does not strike directly on the filtering material, but enters the shell at right angles to it and at so low a velocity that the dust rests lightly on the felt so that the accumulated dust, which is porous, readily permits the air to pass through it, while the vibration of the truck or tractor shakes off the collected dust, allowing it to be discharged

through the perforated openings in the bottom of the filter shell to the ground. From this feature the filter gets its name of "Self-Cleaning," and it is claimed that the device requires practically no attention from the operator for this same season.

The felt filtering material also is treated by a special process that makes it much more efficient.

Description of Air Filter.

The air filter consists of an outer shell of ample size, perforated with rows of small holes spaced equidistantly, which run from top to bottom of shell. Perforated covers fit the shell top and bottom. They are provided with metal sleeves, which hold the outer shell in proper alignment and form the inner core or tube. Inside of the shell supported by wire webbing is the filtering material, consisting of specially treated felt, which is positioned equidistantly and fastened to the center core or tube.

Flexible metal tubing is used to connect the air filter with the carburetor air intake.

\$100,000,000 LICENSE FEES.

Passenger car and trucks owners paid \$98,720,852 in license fees to the various states last year, according to B. F. Goodrich Co. figures. Of this amount about \$88,850,000, or approximately 90 per cent. goes into the construction of good roads. This sum would build 3000 miles of hard surfaced roads highways. The total of fees is about one-third greater than in 1919. There was a big increase in the South, which presages an early improvement in the roads of that section.

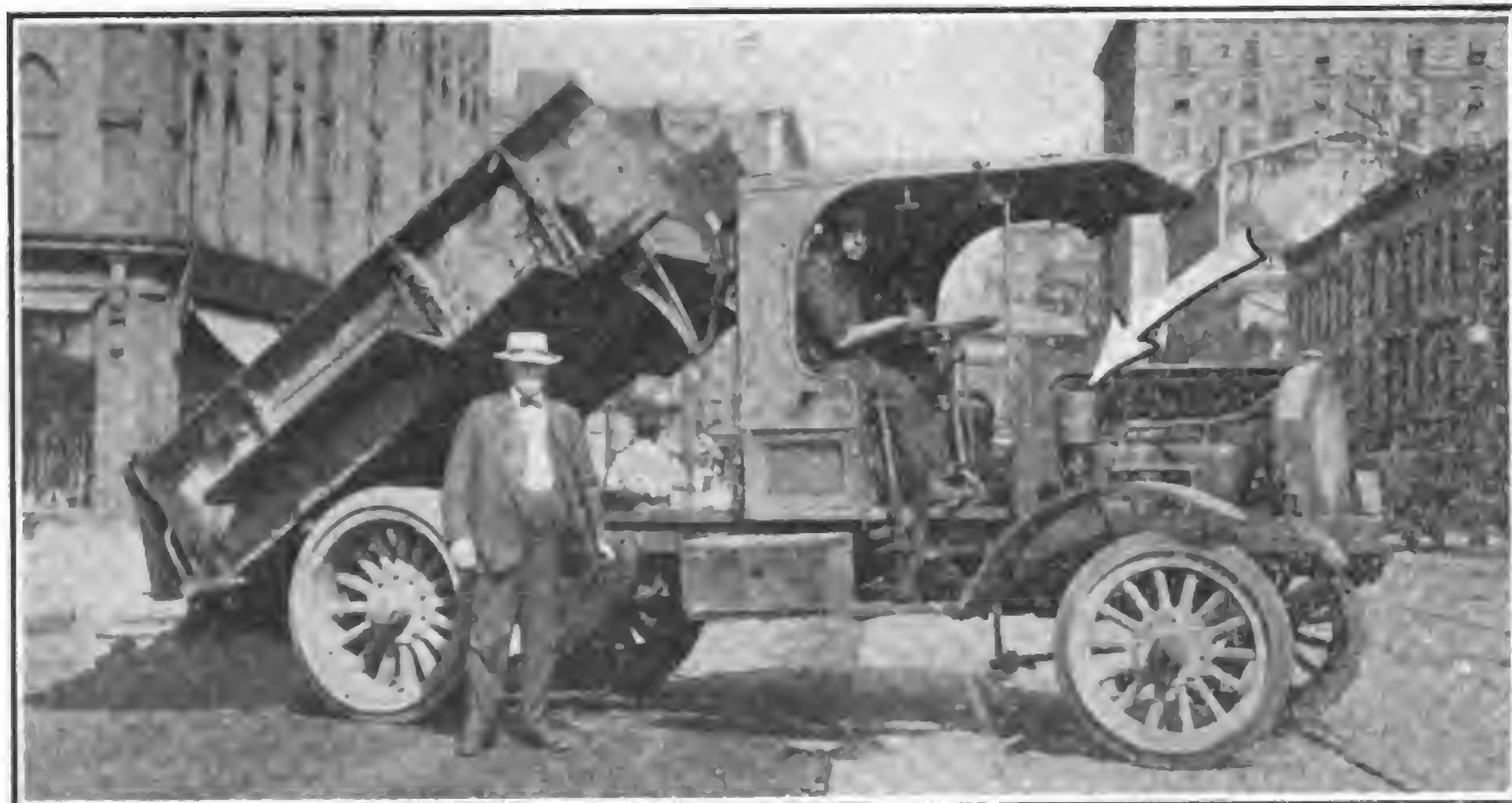
DENBY DEALER AT CHICAGO.

A new truck retailing company in Chicago has opened offices at 1509 South Michigan boulevard. The company is called the Chicago Denby Sales Co. and deals in the lines of trucks that their name indicates. S. S. Gilbert, a well known truck factory man and his brother, N. O. Gilbert, until recently general manager in the Chicago district for Reo passenger cars and trucks, are the principals.

TAYLOR WITH ACASON.

W. F. Taylor, New York, has been appointed eastern sales director of the Acason Motor Truck Co. He was formerly sales manager for the Federal truck distributor in Philadelphia and later was associated in handling Signal trucks in New York territory.

During the Chicago show the Selden Truck Corporation exhibited its product at the Mitchell-Selden Sales Co., 2334 Michigan avenue. The company had its headquarters at the Congress Annex hotel, where many dealers called.



Arrow Shows the Staynew Self-Cleaning Air Filter Installed on a Heavy Duty Motor Truck.

Industry Can Make Boston Show National Trade Reviver

Like an oasis in a desert or a lighthouse at sea the Boston Automobile Show looms before the industry.

It is the lever which can move the truck world onto firm footing. It is the one show of the year thoroughly equipped to reconstruct the market. Centered within it are all the elements for building business and restoring the lost selling era.

Its success is certain yet its productive results can be multiplied many times by a rallying behind it of all the forces that have made the making and merchandising of trucks a national institution. The show can go along on its own and thrive. But the acme of accomplishment can be reached only by the merged energy of the far-flung units it would serve.

The truck department of the show is for the benefit of the truck industry. The manufacturer, distributor, dealer or salesman who bends his back, raises his voice or wields his pen in its behalf is working for himself. He gives only what he owes.

Staged in a city of industrial and commercial influence, in the heart of a thickly populated district, in a zone where truck utility has been demonstrated, with adequate housing facilities, powered by past achievements, managed by constructive, practical men of experience in the field, the coming show stands out as the open sesame to the land of promise. Accorded the whole-hearted support of the industry it can well be the key to open wide the market doors and let the truck merchant in.

The Boston show has long since been "sold out" as far as space is concerned. The task now is to make it the medium to sell the industry to the public and to sell it at its full value. Its worth depends on the calibre and horsepower of its units—the makers, wholesalers and retailers of trucks. Skillfully directed, the right kind of effort will make the Boston show the strongest asset in the industry's holdings.

The New England truck market has today a firmer tone than any other trading area. Trucks are being actually sold. Prospects are being pledged. The mere announcements of the coming of the big Eastern show have had a hand in this inkling of early prosperity. An esprit de corps among distributors and dealers in this territory, whereby all have forwarded the common cause, has been a factor. There are other agencies, not least of which is the potency of MOTOR TRUCK.

Born in New England and in its early days dedicated to the trade interests of that section alone, the MOTOR TRUCK of national scope has lent its added power as a promotive impetus to the building and maintaining of those influences which have "sold" the New England field on truck utility and helped to make the Boston show a controlling event in the life of the industry.

What MOTOR TRUCK has done in New England it can do nationally. How far it has gone in this direction words of commendation from manufacturers and merchants, East, West and South, indicate. In hitching its motor to a star it feels that it does not aim too high by aspiring to be the recognized organ of the industry. It would make service to the trade its one intent. As in the past this service would be delivered, as far as practical, unselfishly.

Latest statistics show that more than 100,000 trucks are registered in New England, a trifle more than half in Massachusetts. The population of this territory is 7,508,658. It is the motor vehicle's most fertile field. The March Show Number of MOTOR TRUCK is the one logical agency that can sell the industry direct to this market.

MOTOR TRUCK has been thoroughly overhauled, each part strengthened, and is more than ever equipped to add to the productiveness of the industry. It asks only the same measure of cooperation it will freely extend.

In directing attention to the business builder the Boston show can be made by a unity of interests MOTOR TRUCK is doing a duty that is part of its established programme. It realizes, perhaps even more than the man in the factory and on the selling line, that the Boston show—especially this year of 1921—is the barometer of the automotive trade. Whether the barometer rises or falls the industry and its units must decide.

UTILITY OF THE WOOD-DETROIT HYDRAULIC HOIST

The Wood-Detroit Hydraulic Hoist & Body Co., Detroit, Mich., manufacturer of steel dump bodies and hydraulic hoists, is considered to be one of the largest makers of these units in the United States. This concern specializes in the Wood-Detroit hydraulic hoist and the horizontal hoist for unloading dump truck bodies.

This type of hoist is recognized as standard equipment among dealers and users. From an economical and general utility viewpoint it offers all the advantages claimed for it of quick and easy unloading. It is stated that over 90 per cent. of the motor truck manufacturers of the United States specify Wood-Detroit hydraulic hoists and steel dumping bodies as standard equipment. The thousands of truck owners using power equipment apparently have induced many others, when purchasing vehicles, to specify the same.

The Wood-Detroit hydraulic hoist may be attached to almost any type of commercial vehicle frame and is operated by the power plant of the truck through a power take-off provided at the side of the transmission case. It is intended primarily for use with truck units of two tons capacity or larger but, for smaller vehicles not equipped with a power take-off, a special power connection to the engine is provided.

Where time is a factor, the use of a hoist is a necessity. It saves greatly in time and labor and increases the possible daily tonnage of the vehicle. Where the loading is also done with power machinery, still further tonnage may be gained. A truck kept moving is always earning returns, and quick unloading is a mighty factor in economical and profitable vehicle operation.

Oil the Operating Medium.

Oil is the medium used to operate the Wood-Detroit hoist. Energy from the engine, through the power take-off at the transmission, drives a geared pump, which fills the cylinder of the hoist quickly, lifting the load easily, by the

action of the ram in the cylinder, from the level to the raised position. By the turning of a valve and release of the clutch or the throwing out of the gear set lever the hoist and body are held in the raised position until the body is emptied. To release the hoist, a second valve is opened and the weight of the body on the ram forces the oil out of the cylinder rapidly and the body is lowered with an easy, cushioning effect to its normal position. The column of oil in the cylinder, when in the raised position, is stated to present a surface of about 30 square inches.

The oil pressure pump, which supplies the lifting force, is very simple in its design, consisting of two steel gears operating in a continuous bath of oil. Grooved pulleys are placed at the top of the ram through which run steel cables, fastened at one end to the bottom of the hoist and, at the other, to a projection extending downward from the front end of the body.

PLAN TO BUILD LIGHT DUTY TRUCK AT SYRACUSE, N. Y.

The Nera Cor Corporation, being organized at Syracuse, N. Y., by J. Allen Smith, who recently resigned as president of the New Process Gear Corporation and the United States Light and Heat Co., and as vice president of the Willys Corporation. He will be associated with Carl Neracher, who also has held an important position with the New Process Gear Corporation. It is understood it will be a commercial car and will be ready for the market some time in the next six months. Neracher is the originator of the vehicle, which is not entirely unlike an English invention largely used abroad. Special virtues claimed for it are its exceptionally light weight and economy of operation.

Lower house of Congress has passed bill providing for dumping of 10,000 army trucks on the open market.

N. A. C. C. TAX PLAN.

The National Automobile Chamber of Commerce has proposed the following federal taxation plan:

Reduce ordinary expenses from war standards to sane, normal standard at once.

Reduce the naval and military programme to its lowest practicable point.

Fund cost of the war, spreading it over period of not less than 50 years.

Refund Victory notes when due.

Refund war savings stamps when due.

Fund the floating indebtedness.

Use sinking funds to retire early maturing obligations.

Make no new sinking fund obligations payable during a period of five years from the signing of the armistice.

Retire no part of the war debt during this period of materially increased expenses growing out of the war, or not earlier than 1923.

Use proceeds from liquidation sales to pay undetermined liabilities instead of retiring long time bonds.

Pay from taxes, current expenses, notwithstanding that they include excessive expenditures growing out of the war.

Fund demand obligations of Allies and accept funding securities for unpaid interest which they may be unable to meet.

Repeal the excess profits tax.

Reduce surtaxes on personal incomes.

Remove all special taxes growing out of the war, such as transportation, excise and consumption taxes, etc.

Provide additional revenue by a moderate protective tariff.

Provide for further revenue if required by consumption tax on all commodities based on retail sales to consumers.

CLYDESDALE PRICE GUARANTEE.

The Clydesdale Motor truck Co. has guaranteed present list prices against any reduction until July, 1921.



GMC 3 1/2-Ton Truck Equipped with Heavy Duty Wood-Detroit Hydraulic Hoist. Lifting Capacity, 10 Tons.

Federal Five-Ton Truck Equipped with Type "D" Horizontal Hydraulic Hoist. Lifting Capacity 10 Tons. Wood Steel Body.

Building Quality Truck Bodies

PROVIDENCE BODY CO., PIONEER IN FIELD, BY EXHAUSTIVE RESEARCH HAS EVOLVED SCIENTIFICALLY DESIGNED PRODUCT THAT IS USED THROUGHOUT THE WORLD.

By S. G. SWIFT

THAT big manufacturers of truck units which have helped to make possible the wonderful advancement and development of the commercial vehicle industry are not necessarily closely adjacent to the truck manufacturing centers, is made clear by the fact that the Providence Body Co. is situated in the capital of Rhode Island.

With more than 800,000 business wagons in America employed in the transportation of goods in every line of industry, the proper body equipment has played an especially important part in bringing the motor truck to the high position in the business world it now occupies.

On the basis of economy, utility and service, truck owners realize more every day that the saving of time and labor is essentially necessary and that time saved is net gain. This applies with equal truth to the use of power driven equipment in every line of activity.

It is also conceded that the designing and building of truck bodies is a business for the specialist who knows

through extensive and practical experience the actual requirements of truckmen. Such manufacturers fit well into the industry, and to them must be ac-

of the country have retrogressed in efficiency, the motor hauler has progressed in exact ratio. And in this increasingly important factor which contributes so potently to the industrial life of the nation, the Providence Body Co., an acknowledged pioneer in its chosen field, is in a position through its experience and equipment to play an important part.

The history of the company to date is a story of steady achievement that ranks well with the general progress of the industry. For many years the business was conducted as a general wagon building enterprise. The firm was well and favorably known throughout the East

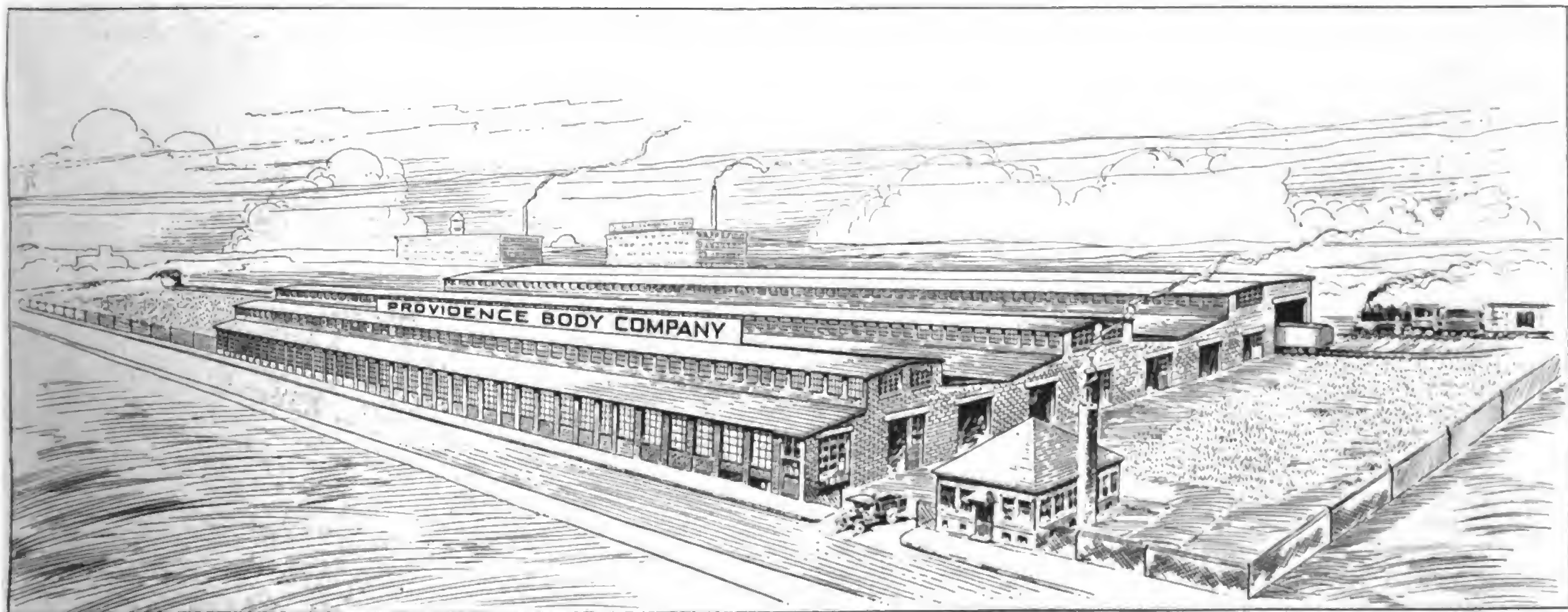
for its gravity discharge coal wagons, and in addition to this particular line of work it also manufactured bodies of special design, which were used in many different industries. Bodies manufactured by the company have always been distinctive in design, finish and workmanship, and this fact, perhaps more than any other, has made the business what it is at the present time.



Founders and Owners of Providence Body Co., Providence, R. I.

corded proper recognition.

Especially is this apparent at the present time with the motor truck coming rapidly to the front as the effective solver of the short haul problem, and oftentimes of extended distances. It is accepted as a fact that fully 90 per cent. of localized haulage will in future be done by the motor truck, and carefully compiled data show that while the railroads



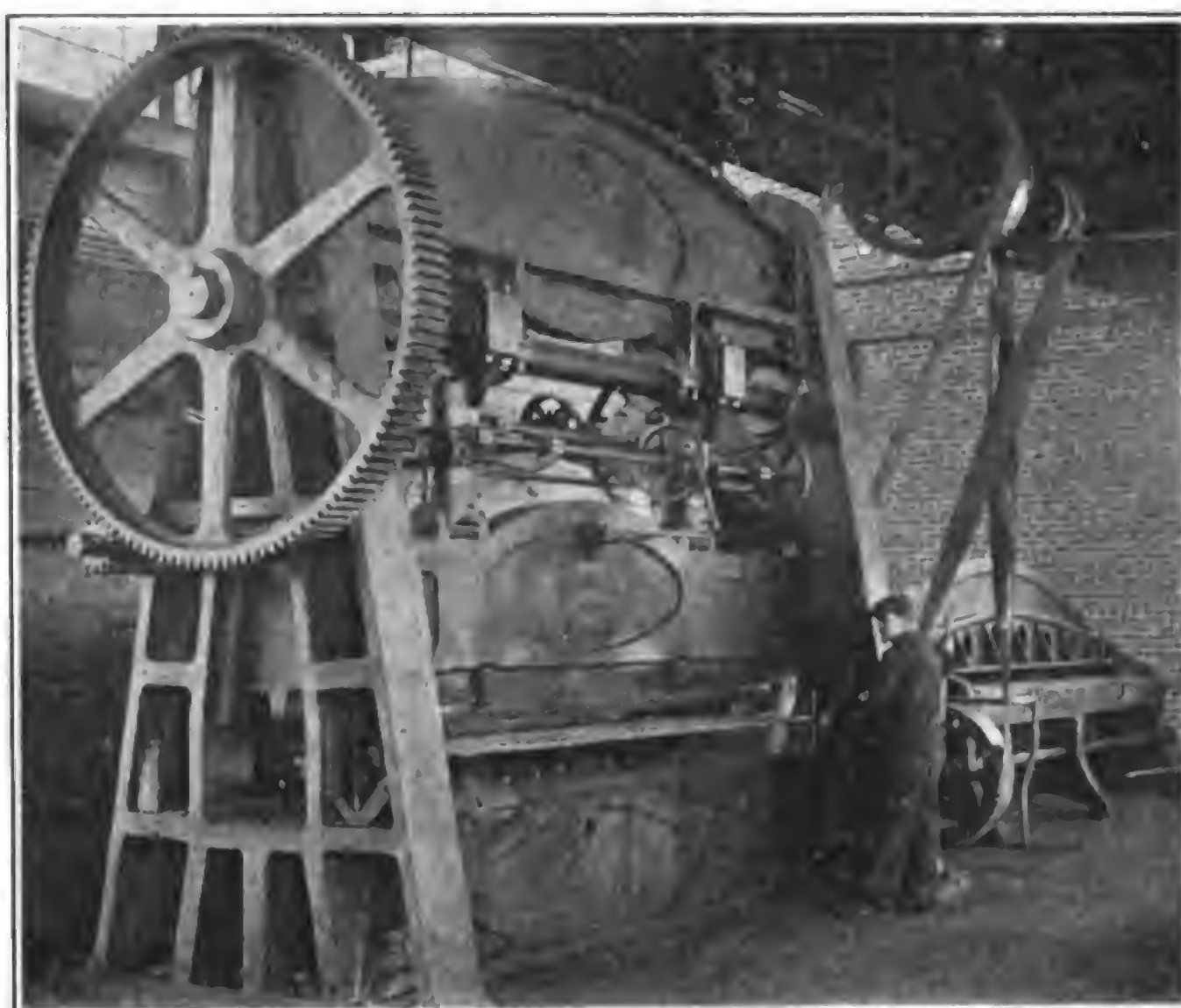
A New Plant Designed Wholly for Body Building, with Units Now in Operation and Others to Be Constructed as Soon as Material Is Available.

About 12 years ago when it became apparent that the motor truck was becoming a commercial necessity, the company started manufacturing truck bodies modeled along the lines of their gravity discharge coal wagon, and in 1909 exhibited a dump body at the Boston automobile show which met with the instant approval of the trade. Following this the company began specializing in the building of bodies for all types of commercial vehicles, and at the present time ranks with the leaders of the industry, distributing its product in quantity throughout the world.

At the start of the war the company was awarded a large share of government business, in addition to which it was called on to manufacture and equip many private ambulance units donated by private interests. Eventually the government officials in charge of transportation called on Joseph W. Monahan the youngest of the three brothers who own and operate the business, to take charge of all special body designing, which he gladly did, the result of his practical mind being well known by his superiors, who accorded him signal recognition.

One of the type of bodies designed by Mr. Monahan which had wide usage was mounted on a five-ton Mack truck chassis that was effectively used to salvage disabled cars and trucks. He also designed a special body carrying a full shoe repairing outfit, with equipment by which 600 pairs of shoes were repaired daily.

Perhaps the most unique government



A 26-Ton Press Which Punches and Shapes Metal for Body Construction.

job of any designed by him while in the service was a degassing outfit. This apparatus, which was becoming generally used at the time the armistice was signed, was a first aid for soldiers who had been gassed, and was highly successful. Tests of the outfit, which worked in conjunction with a Kelly truck, gained the praise of medical, officers of high standing, and reliable authority states that it has become established as regular army equipment.

Body Building Plant Equipped with Special Machinery.

The new factory and additions now in process of construction, stands on a large plot of land in the Elmwood section of Providence. It is ideally located for shipping facilities, being connected by a spur track with the main line of the

railroad between Boston and New York, besides which it is within one mile of the steamship piers from which freighters make regular trips to New York, all southern ports and points in the Mediterranean sea.

The building now completed, along the lines of which the others are being constructed, is of monitor type, so arranged that it may be used as a single structure until such time as the other units are completed, when it will become integral part of the whole. It is of brick construction, well lighted by steel sashed windows of opaque glass, is equipped with Grinnell sprinklers and is heated by an oil burning system.

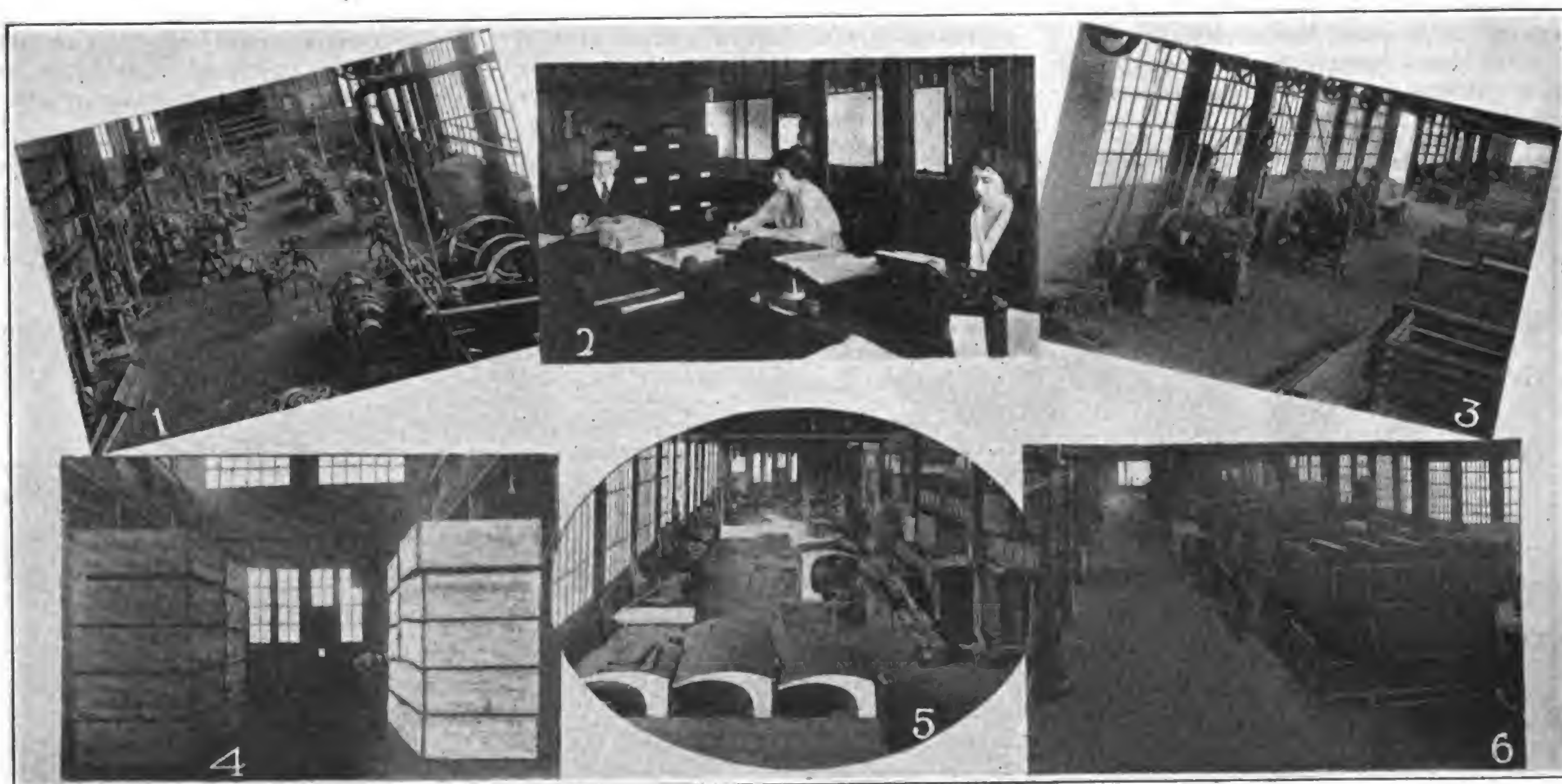
The interior of the building is designed without partitions or gangways to facilitate the use of traveling cranes, which

move the unfinished bodies from one department to another. This method not only saves time and labor, but also admits of using every inch of floor space for manufacturing purposes.

The main offices are housed in an office building which has been designed with a special view of giving the occupants all necessary light, being isolated from the rest of the plant to do away with the noise and confusion attendant on manufacturing.

Machine Shop Manufactures All Moving Parts.

The machine shop, which is equipped throughout with specially designed machinery, represents the ultimate in efficiency. All power for portable equipment is obtained from air compressors, and practically every operation is done



1—Machine Shop and Air Compressors. 2—Interior of Office. 3—Forge Shop Equipment. 4—Bodies Packed for Overseas Shipment. 5—Wood Shop Equipment. 6—Storage Section for Finished Product.

by these machines, even to the painting of the finished product.

The compressors are set close to individual motors, which drive them with a



Combination Dump Body with Sides Removed.

short belt connection, thus insuring a steady flow of air into the containers. Cooling is done by means of a pump which forces a steady flow of water through the water jacket. The wood working department is splendidly equipped with all that is modern in the way of power saws, planes and drills, and is staffed by a corps of workmen who have had long experience in wagon building, which is a distinct asset in the building of truck bodies.

Power Press Weighs 26 Tons and Performs Many Operations.

The press department, equipped with many small presses, punches and drills, also contains a 26-ton press, which bends a 12-foot piece of quarter inch steel in any fashion desired by the use of dies of which several sets are used. It also punches 35 rivet holes at one operation, and is an especially useful piece of machinery. This department contains a 10-ton power shear, which can make a clean cut in a 12-foot sheet of steel of quarter inch gauge, and is otherwise equipped in an up-to-the-minute manner with all sorts of power tools, many of which were specially designed for the work in hand.

The forge shop plays an important part in the building of different bodies. In this department, besides several forges of the coal burning type, is a number of gas forges, which are used for heating and bending operations where it is necessary that great length of heated surface be obtained.

These are operated by a 12-ounce air pressure, from a positive pressure blower. The air and the gas, when chemically mixed, form a Bunsen flame, which allows heats of 24 inches. Each forge is equipped with a power hammer, and a series of small traveling cranes handles all metals worked upon. Smoke and gases are exhausted from the building



Tail Gate Hinged for Dumping.

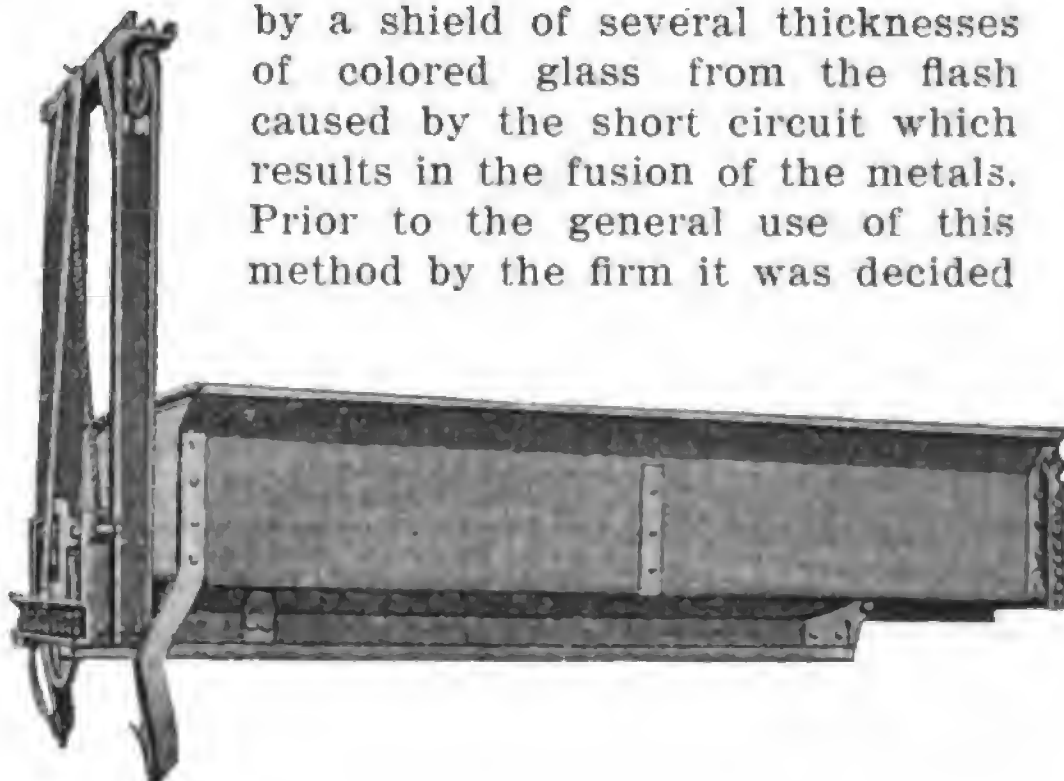
by means of a vacuum system, which also supplies fresh air.

Electric Welding by Alternating Current.

The electric welding apparatus employs an alternating current instead of a direct current. This method has been used extensively in the shops of England, but is comparatively new in this country, first being used at the Hog Island Ship Yards during the war.

The current is taken from Public Utility company in the form as furnished for power purposes, a transformer being located outside of the building to reduce the voltage. The current is again regulated by a resistance box, or coil, by the operator, according to the size of the weldtrode or welding rod to be used. The voltage is cut down to a minimum, but amperage is retained.

The weldtrodes are made of ordinary steel wire and conform as near as possible to the carbon point of the material that is being welded. The weldtrode is insulated with asbestos thread holding a very fine magnesium wire longitudinally with the rod. The operator is protected by a shield of several thicknesses of colored glass from the flash caused by the short circuit which results in the fusion of the metals. Prior to the general use of this method by the firm it was decided



The All-Steel Body.

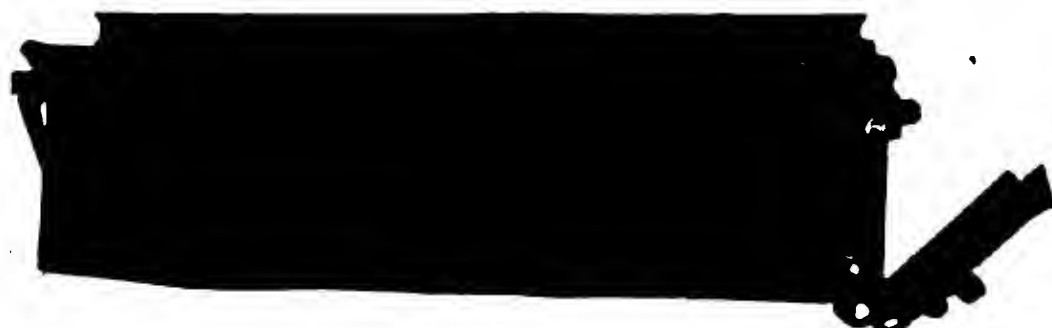
to make a thorough test of its adaptability for the purpose in hand.

The first experiment was made with two pieces of four-inch, 7½-pound I beams held at right angles and welded on edges of contact. A comparison was made with riveting of two like pieces. The test showed the welding stood four times the pressure that the riveting would stand. Another interesting test was made with two sheets of No. 10 gauge blue annealed steel 10 feet long. The edges of sheets were welded on the 10-foot length. The welded sheet was then placed in the press and was bent to a six-inch radius the weld or joint coming about in the centre of the bend, and upon examination after bending, was found to be perfect the full 10 feet length.

The latter test was considered by the firm to be the most severe that could be applied and evidenced beyond doubt that the general use of this system of fusion could be applied in all cases where perfect fusion was necessary.

Another method of welding sheets which has become common in the daily routine of the factory is to fuse two sheets with edges in contact, to cover

wooden floors of bodies, perfect fusion being made without any injury to the wooden floor underneath the sheet. This method is applied to fusing of sheets on



Composite Combination Dump Body.

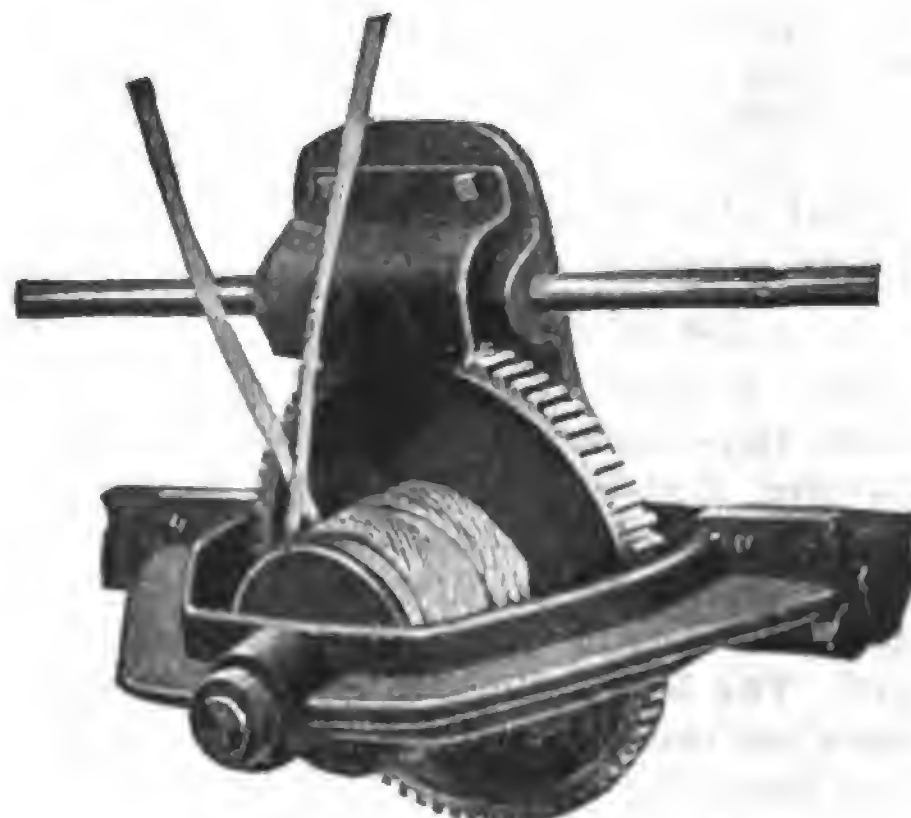
the composite combination dump bodies, making the whole sheet one large compact plate.

At the present time the company has largely discontinued the manufacture of specially designed custom built bodies, and is concentrating all its attention on the construction of three special types for which there is an ever increasing demand from wholesalers. These bodies are built entirely from the raw material, as no machined parts come into the factory.

Economy Body Time and Labor Saver.

The Economy combination pump and express body, placed on the market May, 1918, has met with ready sales, and this is largely accounted for by two material facts. First, the general adaptability for all-purpose work, and second, the rugged way in which it is put together. Another feature which has contributed to the general favor with which the body has been received by the wholesaler is seen in the method of attaching it to the chassis. This is gained by having the sub-frames project six inches on either side, the bolt ways being so bored as to make it instantly adjustable to any width frame by the use of a common wrench. Dealers have been known to unload the body from the freight car and have it mounted on a customer's chassis in 10 minutes.

Experience, the deciding factor in body building, has played an important part in the development of the Economy body, and the company now feels that it is more than ever in position to offer truck owners the most practical time and labor saving body equipment to be had. The body is so designed that it can be used for practically all kinds of work. A chassis equipped with an Economy body may return from a coal carrying job and in three minutes can be made ready for



Showing Gear Driven Hoist.



One of Fleet of Specially Designed Bodies Manufactured for Standard Oil Co.

hauling a platform load of lumber, cotton, packing cases, wool, pipes, steel bars or farm products.

The special features have been appreciated by the users in all parts of the world. The fact that it is an "always ready body" for almost every use to which a light chassis is adopted has enhanced the sale and in many cases has been the prime factor in the sale of the chassis itself.

The body proper or box is made of pressed steel and electrically welded at all joints, making it one solid metallic part. The worm gear is malleable casting and is made integral with drum on which the cable is wound. The gear is machined out to receive the worm. This combination is simple and as it contains only a few parts is almost fool proof. The sub frame is made six inches wide on each side and has a series of holes inserted which will receive the fastening bolts for any width chassis frame.

The body and hoist is a complete unit in itself and from the fact that it can be applied so easily to any chassis is an ideal proposition for a dealer to handle, as it eliminates the trouble of furnishing extra parts and labor.

The sides of body are flared to allow a greater width for loading light material over upper edges. The tail gate is made to hinge at both top and bottom edges. When used for coal, sand or stone, the lower pins are removed, this allowing the lower edge to be released and swing out from the floor of body. When used by a coal dealer to fill baskets the small scuttle or sliding door is utilized, allowing coal to leave body through the smaller opening. If the user wishes to carry cases or lumber, the upper pins are removed and the tail gate is suspended to level of floor, extending it 16 inches. It is employed also as a partial skid when it is desired to discharge cases to a platform.

The All-Steel Body.

The all-steel body, well known for some time, has substantially the same features that characterize the Economy body. Dumping is accomplished by a worm and gear hand operated hoist of only two moving parts exclusive of pulleys. The hoist takes up but nine inches space on the chassis frame and is operated from either side of the truck. The worm and gear hold the load at any an-

gle without the use of ratchets or other contrivances. Accidents to the operator, caused by the body falling unexpectedly, are impossible. There are no chains, sprockets, pinions or jack shafts to break and give trouble. Raising the load requires little effort because of the mechanical efficiency of the worm and gear.

The Composite Combination Dump Body.

Heretofore truck users have not taken advantage of the many uses of a combination dump body. The idea has been prevalent that a dump body was fit for only coal or sand, very few realizing that a body that can be converted into a platform can discharge almost any kind of merchandise that a truck will carry, such as cases, lumber, wool, cotton, farm products, pipe, steel or bars.

The composite combination dump body when elevated to proper incline forms a skid and goods slide gently to platform. Large cotton mills have dispensed with the use of two trucks by having their trucks equipped with combination bodies and hoists.

When hauling coal the sides are used and the end gate is hinged from the top. When hauling cotton or product in cases the sides are removed, making a regulation platform, which, when elevated, will discharge the load in a few seconds.

These bodies are lined with steel throughout, and all edges of steel plates are flanged over edges, making it an im-

possibility to loosen them. The bolsters and subsills are four-inch I beams. The front is braced on the ends with vertical braces, giving an ideal support to the hoisting arms. The tail gate, when placed on a level with floor is supported by a sliding loop, which is carried underneath the body when not in use. By the use of the tail gate rest the floor space is lengthened about 31 inches.

The design of this body is the result of several years of experience and the company has placed before the truck users one of the greatest bodies, both as a time saver and money maker, that has yet been produced.

Company Has World Market for Product.

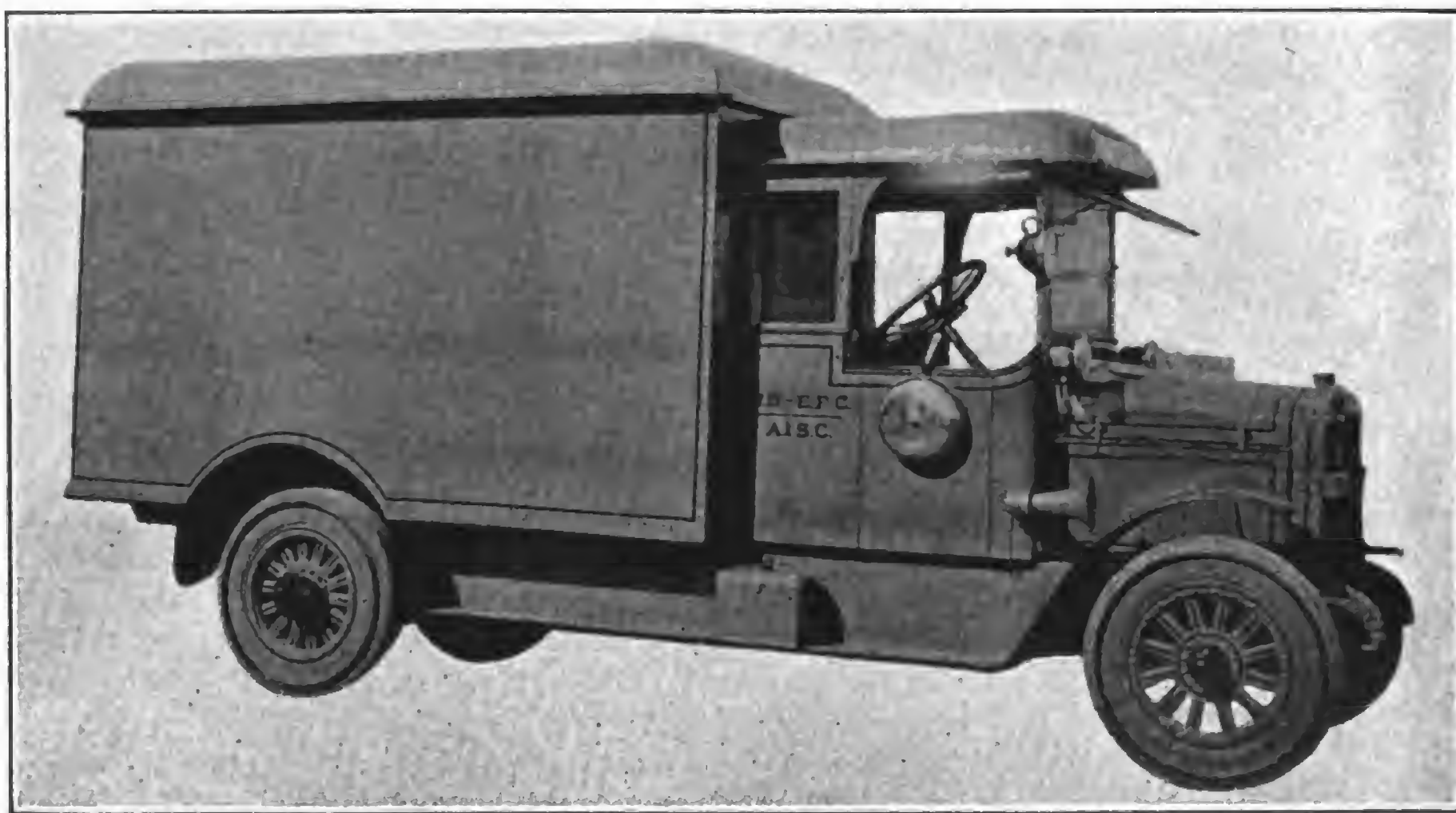
Aside from the very large number of bodies sold to the United States government, the company has also marketed large quantities throughout the United States. Shipments made during the last three years have gone to nearly every country in the world, and reports come into the company at frequent intervals telling of their use on various projects in foreign lands.

Enterprise Owned and Controlled by Three Brothers.

The Providence Body Co. is owned by three brothers, all of whom have been identified with the business since its inception. They are: Joseph W. Monahan, president; who gives his personal oversight to all designs and details entering into construction; Thomas H. Monahan, treasurer, who acts as plant supervisor, and John F. Monahan, secretary, who is sales and territory manager.

Consider Truck Body Business Will Reach New Level in 1921.

The officials of the Providence Body Co., after a careful survey of the field, anticipate and are in a position to do an unusually large volume of business during the coming year. From their viewpoint they consider that trucks are now used for 90 per cent. of all short hauls between cities. There is also the single item of road construction and repair for which the various states have already appropriated \$1 240 000 000, which is

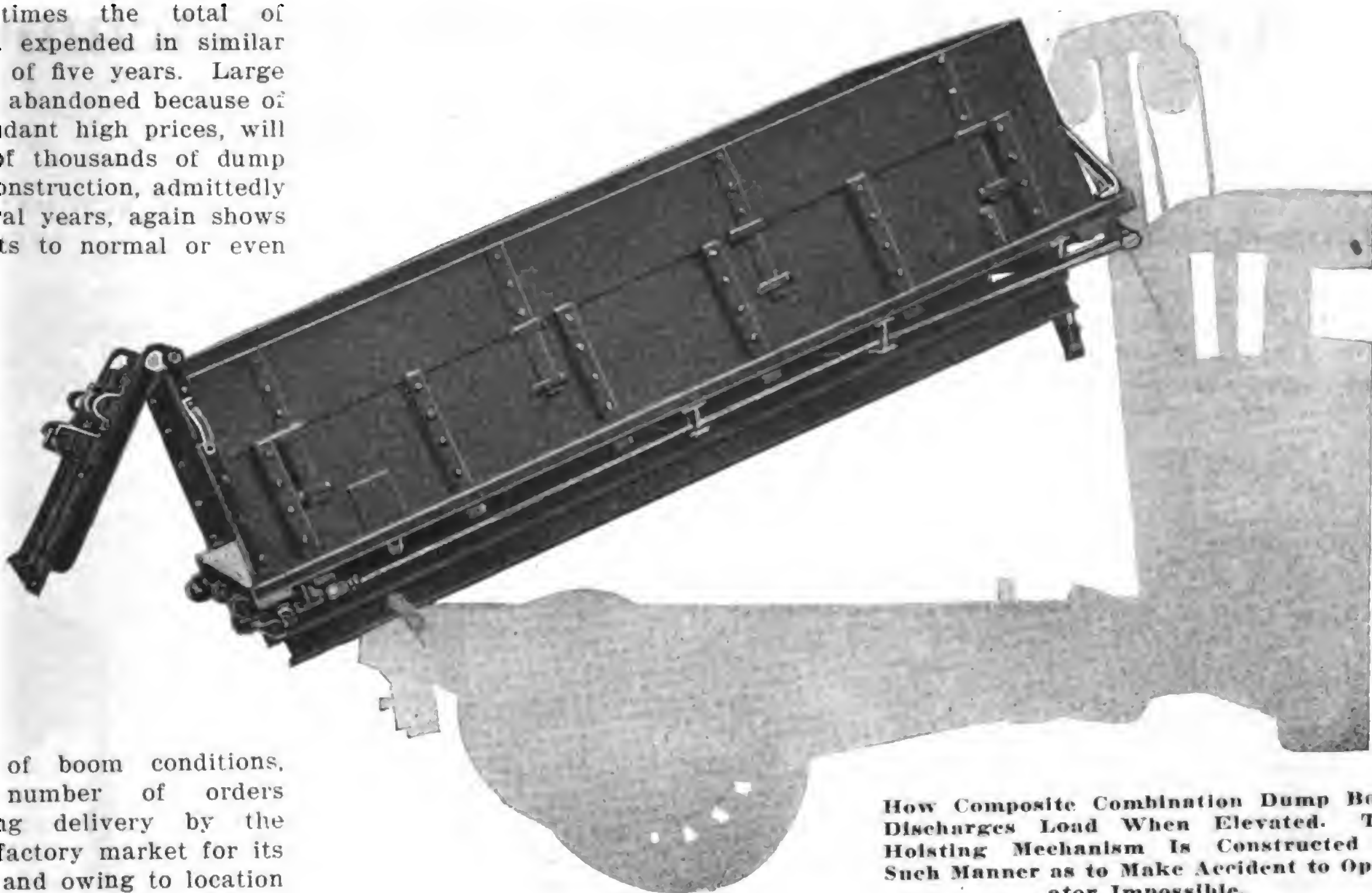


Armored Car Used by Paymaster at Hog Island. Body Designed and Manufactured by Providence Body Co.

more than 10 times the total of all that has been expended in similar work for a period of five years. Large irrigation projects, abandoned because of the war and attendant high prices, will call for the use of thousands of dump trucks. General construction, admittedly stagnant for several years, again shows activity that points to normal or even better conditions.

All of which means that the motor truck is rapidly winning its way in every haulage need.

The body business is bound to share in the general harvest, and the manufacturer of Economy bodies has every reason to feel optimistic, especially as material proof is already seen of boom conditions, in the large number of orders booked for spring delivery by the company. A satisfactory market for its output is assured, and owing to location and equipment, with all necessary resources, the Providence Body Co. is in a position to cater to the trade in an efficient manner. Bodies made for serv-



How Composite Combination Dump Body Discharges Load When Elevated. The Hoisting Mechanism Is Constructed in Such Manner as to Make Accident to Operator Impossible.

ice, built on honor, is their standard—a quality product recognized as universal

equipment on any vehicle in general haulage service.

O. ARMLEDER CO. OPENS BRANCH HOUSE IN NEW YORK

The O. Armleder Co., Cincinnati, O., which for the past 11 years has been manufacturing motor trucks in one-ton, 2½-ton and 3½-ton sizes, has opened a branch house in Brooklyn, under the name of the Armleder Motor Truck Co. of New York, at Third avenue and Butler street. John S. Hyatt will be manager and will have full charge of the business, and A. W. Christopher will be sales manager. Mr. Hyatt is well known among the business men of Brooklyn and New York and takes charge of the business fully prepared to handle it efficiently. Mr. Christopher has in the past been associated with the sale of Armleder motor trucks in New York.

In order that the immense fleets of Armleder motor trucks which are being operated in New York can have prompt service, the new Armleder branch will carry an immense stock of repair parts at the Brooklyn office. The most efficient mechanics and service men obtainable have been employed, under the leadership of a thoroughly experienced service man. Prospective customers will receive courteous attention from Mr. Christopher and his corps of 10 salesmen, who will visit customers in New York and Brooklyn.

Armleder motor trucks are well known throughout the country for their high quality and the numerous patented features which have been incorporated in the trucks, especially the spring construction, using a spring 63½ inches

long, without shackles or shackle bolts, have won general commendation.

DISCUSS TRUCKING PROBLEMS.

The February meeting of the New York Electrical Society was devoted to a discussion of New York trucking problems, with J. J. Riordan of the U. S. Trucking Corporation as the principal speaker. The meeting was held Feb. 9 and was followed by an inspection of the electric vehicle exhibit which the New York Edison Co. was holding in its big show room at Irving place and 15th street. The subject of Mr. Riordan's address was "The Trucking Problem in New York City," which he discussed in an enlightening and practical manner.

BRAHAM WITH DELION TIRE.

John J. Braham, Jr., of Brooklyn, N. Y., who until recently was connected with the sales department of the Keystone Tire & Rubber Co. of New York city, and who is widely known to the tire trade throughout the country, has joined the Delion Tire & Rubber Co., and was elected a vice president at the annual meeting of the board of directors. He will continue to reside in Brooklyn and will make his headquarters in New York at the company's branch, 203 West 72nd street.

NEW AUTOCAR DIRECTORS.

The Autocar Co., Ardmore, Pa., has increased its directorate from seven to nine with the addition of J. Howard Reber and Roscoe T. Anthony.

GOODYEAR REFINANCING PLAN INVOLVES \$85,000,000

Counsel for Goodyear Tire & Rubber Co., Akron, O., authorizes following statement in behalf of the company:

"After several weeks of negotiations between company and representatives of various classes of its creditors and its stockholders, a plan for readjustment of the debt and capitalization of company has been agreed upon. Plan contemplates issue of approximately \$25,000,000 first mortgage 20-year eight per cent. sinking fund bonds and \$25,000,000 10-year eight per cent. sinking fund debentures and \$35,000,000 eight per cent. prior preference stock for claims of general creditors.

"Bonds and debentures or their proceeds will be used to pay off bank debt, which is largely secured, and for other corporate purposes. General creditors will receive prior preference stock for existing debt and in part payment for future deliveries of material. Holders of existing preferred stock will receive preferred stock of reorganized corporation, having substantially same rights and preferences as present preferred stock, share for share, and holders of existing common stock will receive common stock of reorganized corporation, which will probably be without par value, share for share. The \$25,000,000 of debentures, together with 250,000 shares common stock, and also \$35,000,000 prior preference stock, are to be offered for subscription to existing stockholders."

Garage and Service Station Machinery Tools and Equipment

VALVELESS GREASE BUCKET AND LEVER ACTION PUMP AND GUN.

The Boe Manufacturing Co., Minneapolis, Minn., is adding two new devices to its well known line of automatic and repeater grease and oil pumps. These are the Boe lever action barrel pump and

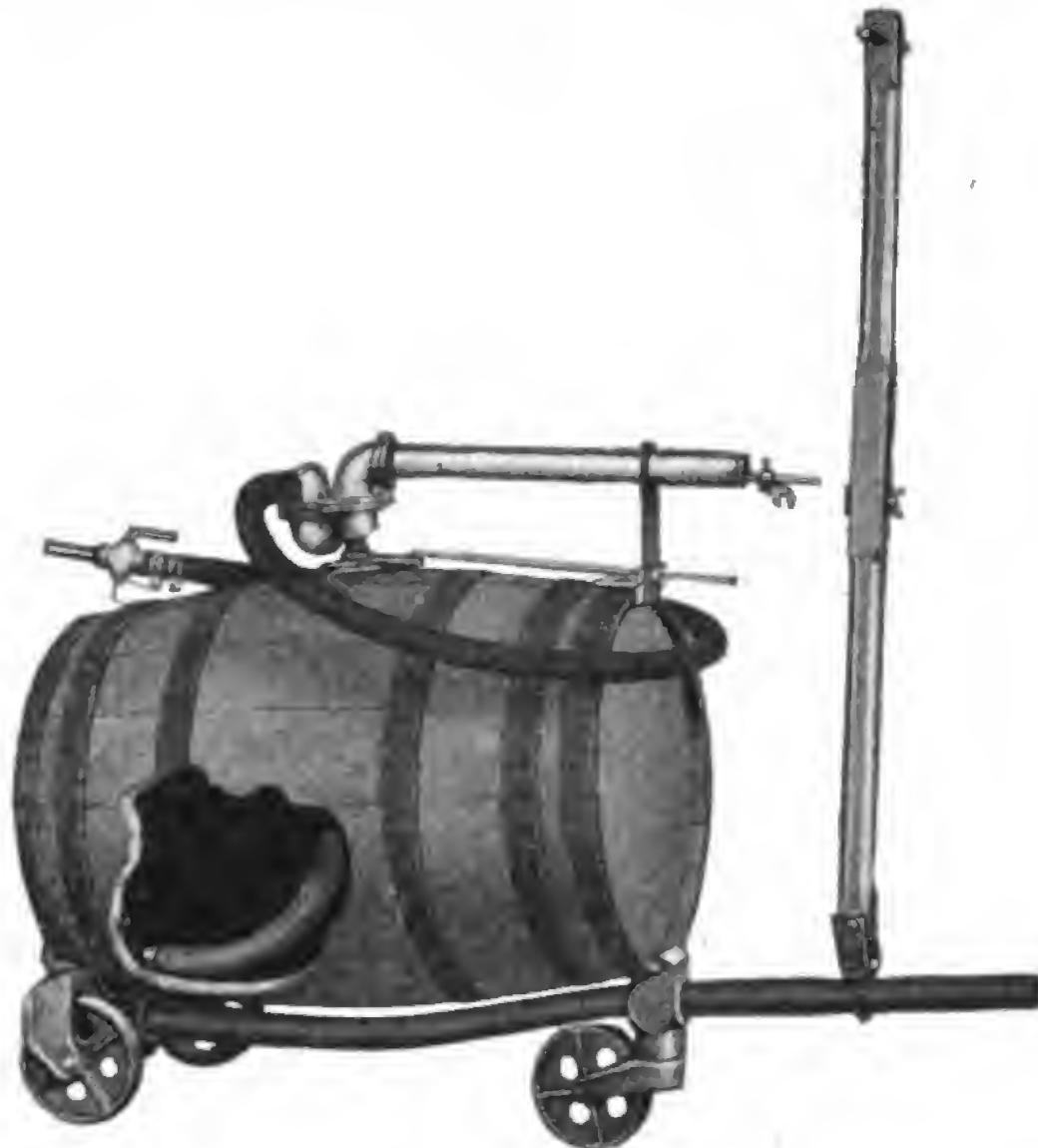


truck and the Boe valveless grease bucket.

In the former the entire truck and pump can be set up ready for business in a few seconds. The truck tongue acts as a pump handle for operating the

pump. The piston stroke is adjustable to dispense $\frac{1}{2}$ pound or $\frac{1}{2}$ pint to each stroke. It obviates the lifting and rolling of heavy barrels, as the truck may be rolled up to the barrel, the barrel laid down and hooked on.

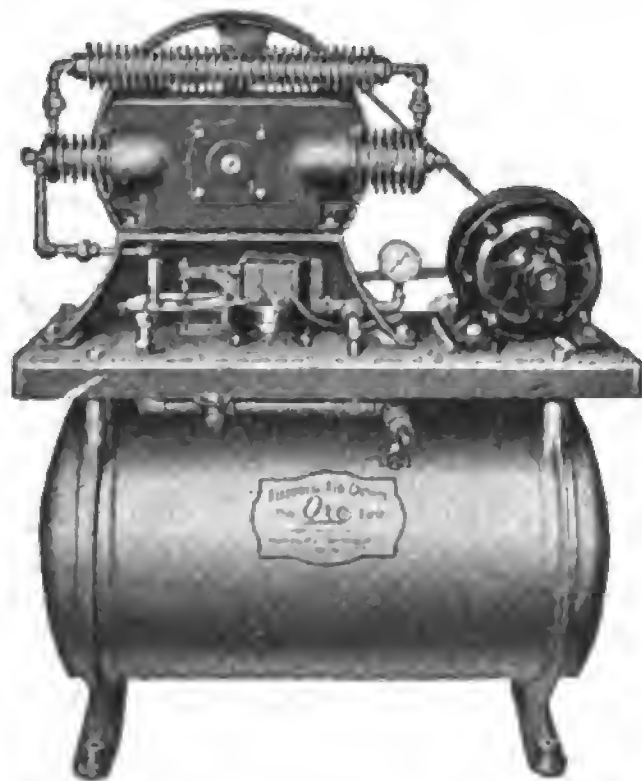
The Boe valveless grease bucket is extremely simple in construction. There



are no valves to stick, the piston is air tight and the entire end of the lower pump cylinder is wide open on the intake stroke, but closes automatically on the discharge stroke, preventing the lubricant from getting back into the tank.

MODERN AIR COMPRESSOR FOR TRUCK PNEUMATICS.

The Auto Compressor Co., Wilmington, Del., manufactures a very complete line of air compressors for the service station. Special effort is concentrated on the large sizes suitable for inflat-



ing the larger size Glant cord pneumatics as used on motor trucks.

The motors fitted to air compressors of this type are unusually heavy, the tanks are of large capacity, designed to carry a special filtering fluid, which removes oil, dust and dirt from the air and

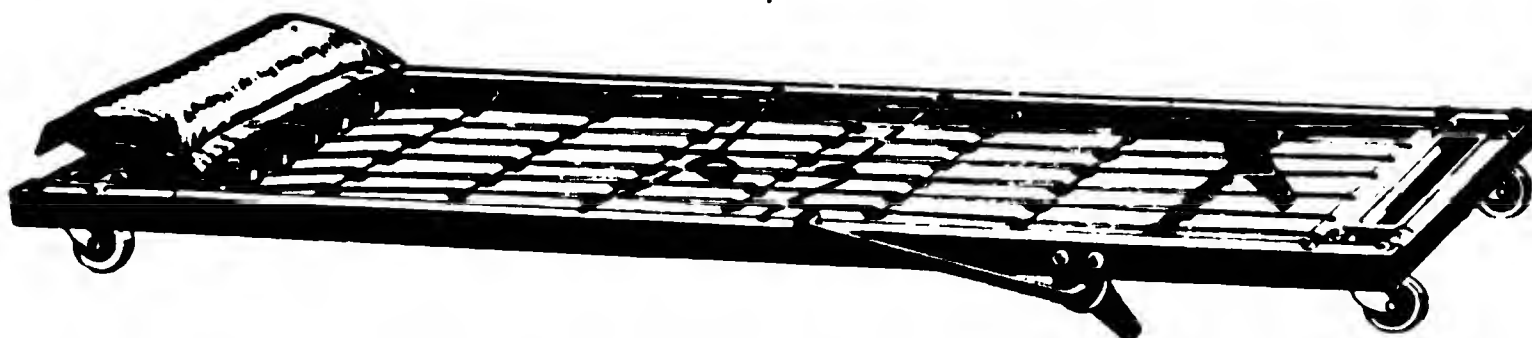
delivers the air to the tires in a pure state.

The compressors are of two types, single and double stage, the smaller types being used for passenger car tire inflation and the double stage types for the large cord pneumatic tires such as are used in truck work.

The capacity of the compressors vary from the smaller single types carrying up to 75 to 100 pounds and the double-stage types ranging from 100 to 300 pounds capacity.

AUTO REPAIR CREEPER.

The Foster Brothers Manufacturing Co. is producing the Foster Auto Repair

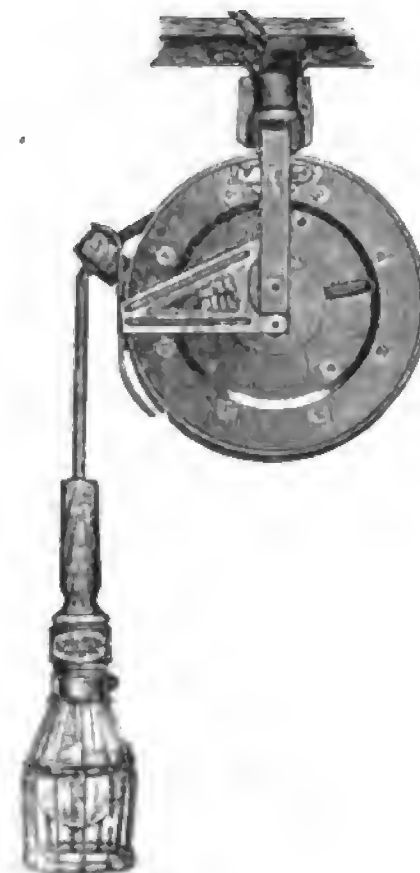


Creeper, which is of special interest to service stations catering to general repair work in connection with motor trucks.

The device consists of a steel frame

AUTEX AUTOMATIC EXTENSION REEL.

The Cincinnati Specialty Co., Inc., Powers street and Sylvan avenue, Cincinnati, O., offer a device to service station owners, known as the Autex Auto-



matic Extension Reel, which has unusual merit for service stations servicing commercial trucks.

The device consists of an automatic reel that may be fastened to the ceiling or other convenient overhead member of the station, is provided with a swivel, which allows the reel to turn freely in any direction and with 25 feet of packing house cord, weather proof socket, handle and lamp, guard (less globe), ready for installing.

To operate, grasp the lamp handle and walk in any direction from the reel, when a slow backward movement causes the automatic lock to catch. To release, give a slight pull. This unlocks the latch, allowing the cord to automatically rewind.

supported on rollers and fitted with wire spring body rest and tension springs at one end. A head rest is fitted over the coiled tension springs, which offers com-

fort to the repairer when working under a car. A positive locking device is fitted at one end which locks the creeper in position when in use, preventing its moving on the garage floor.

CLAYTON & LAMBERT BLOW TORCH.

The new and improved double blunt needle blow torches recently introduced by the Clayton & Lambert Manufacturing Co., Detroit, Mich., are made in three sizes, two-quart, quart and pint capacity. The two-quart torch, No. 206, herewith

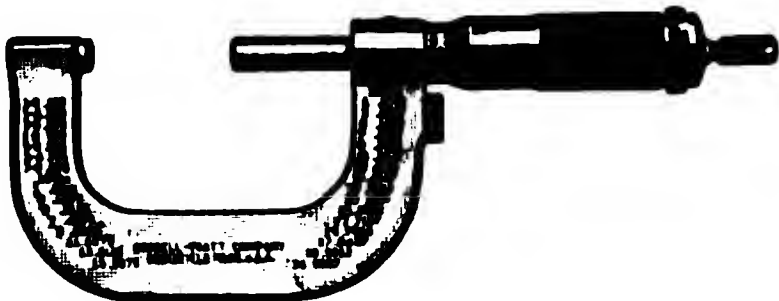


illustrated, is of special interest to all who require a heavy duty torch. The burner is extra large and powerful. The maker claims it produces about 300 degrees more heat than any other blow torch and burns with a pure blue flame,

remarkable for its intensity. Either gasoline or kerosene may be used in operating it.

TWO-INCH MICROMETER CALIPER.

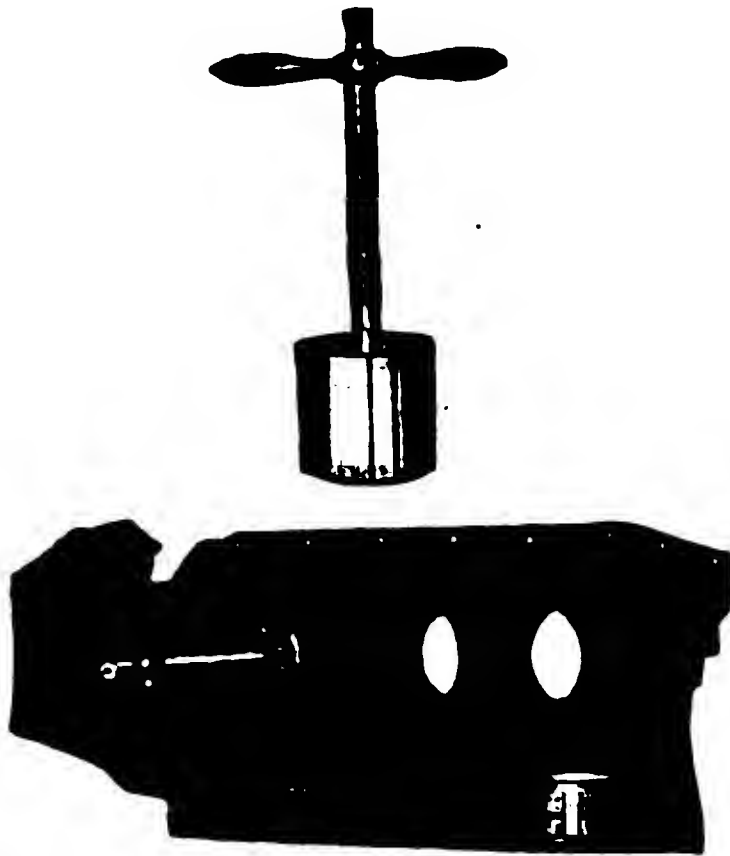
Goodell-Pratt Co., Greenfield, Mass., manufactures a two-inch micrometer caliper fitted with ratchet stop, which will prove of interest to service station repairers. This micrometer is graduated to read by 1/1000 inch from one to two inches, either diameters or lengths. Decimal equivalents are etched on the frame, which is drop forged from solid



steel bar. An eccentric locking device is provided, which holds the screw in any desired position. There is also a ratchet mechanism on the thimble in a position where it can be easily reached by the fingers of the operator. The end of the thimble is provided with a speeder by means of which the screw can be rapidly run back and forth.

CLOVER CYLINDER LAPPING TOOL.

The Clover Manufacturing Co., Norwalk, Conn., has developed a lapping tool of simple design which is a durably made tool that is claimed to grind score marks out of cylinders, and bring out-of-



round cylinders back to true, obviating the necessity for reboring when fitting over-size pistons and rings.

The Clover cylinder lapping tool may be used in electric grinders, in drill press or operated by hand. Made in four sizes, 3 1/4, 3 3/8, 3 1/2 and 3 3/4 inches.

New Motor Truck Accessories

ELWOOD GRAVITY GAUGE.

The Elwood Gravity Gauge Co., manufactures the Elwood Gravity Meter and Pump Tester and distributes it through



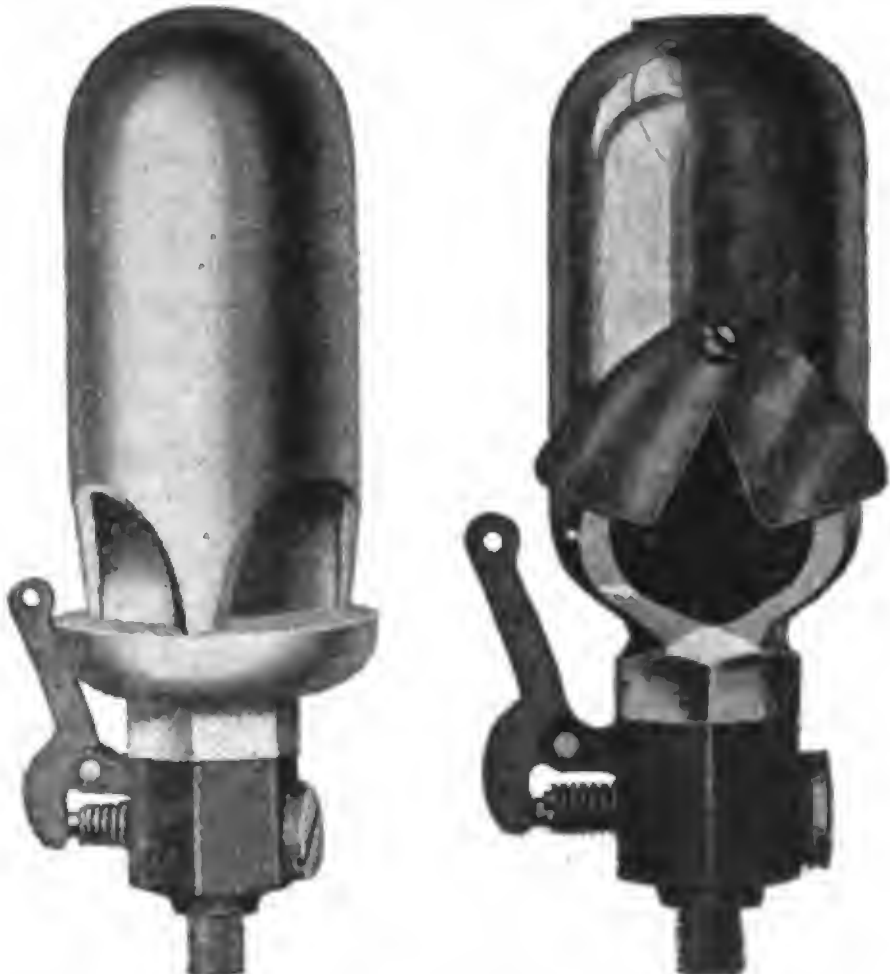
the Elwood Gravity Gauge Sales Corporation, Elwood, Ind.

The gauge is designed to show at a glance whether leaks are present in the units of the pump or storage tank, besides showing the quality of the gasoline. Weather conditions, the manufac-

turer states, do not affect its operation. Leaks are shown by air bubbles rising in the glass as the gasoline is being pumped.

ENGINE COMPRESSION WHISTLES.

The B. & B. Manufacturing Co., 2823-25 Arsenal street, St. Louis, Mo., shows a line of compression whistles for the motor truck engine. They are designed to be screwed into the petcock opening on an L or T-head engine and are oper-



ated by a cord to the steering wheel. R. & B. whistles are made in two types, one a tri-tone and the second a single tone. The whistles are fitted with a check valve, which prevents the compression gases from weakening the compression of the cylinder to which the whistle is attached.

LUBRICANT CONTAINER.

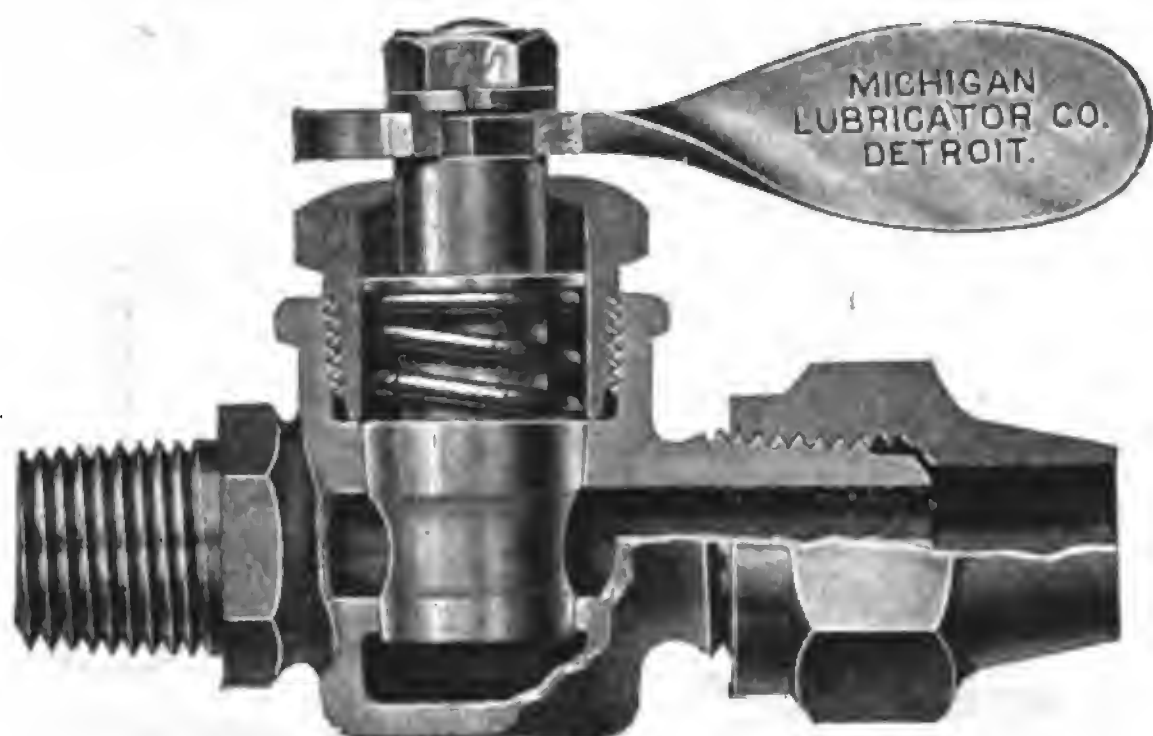
The Bassick Manufacturing Co., Chicago, Ill., is marketing the Bassick lubricant can or container, which is made with a cone shaped plunger. It is designed to fill the compressor of a high pressure lubricating system. By simply pressing down firmly with both hands



the lubricant is forced into the cylinder until it is completely filled and ready for use. This device is especially handy for filling the cylinder of the new high pressure lubricating system, which is being used extensively by truck manufacturers on slow moving bearings of trucks.

MICHIGAN KANT-LEAK GASOLINE COCK.

The Michigan Lubricator Co., Detroit, Mich., show a unique gasoline fuel line



cock that will prove of interest to truck owners who are troubled with leaky gas-

oline cocks.

The Michigan Kant-Leak Cock is designed to positively prevent leakage as the fittings are specially ground to a

true fit and are held tight by nut and spring fastening.

UNIVERSAL WRENCH.

The chauffeur's Universal Wrench, manufactured by Goodell-Pratt Co., Greenfield, Mass., is self-adjusting for any size square or hexagon nut up to $\frac{3}{4}$ inches and will hold round pipe up to $\frac{1}{2}$ inch. The jaws are opened by press-



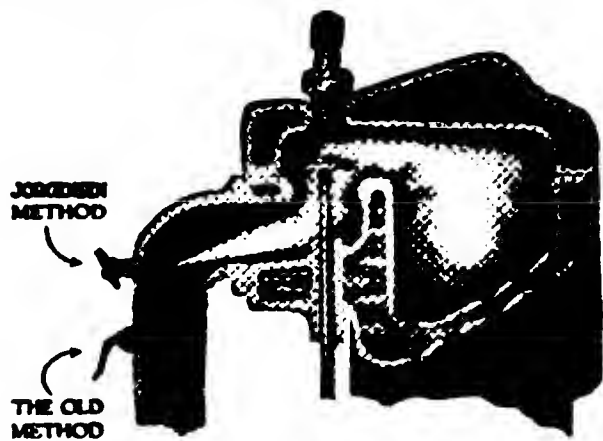
ing the trigger and automatically closed by means of a spring. The entire tool is strongly made from steel and is fitted with hardened jaws. The length over all is seven inches and the net weight is eight ounces.

JORGENSEN PRIMER.

The Jorgensen Vapor Primer, which is being distributed by the United Motors Service, Inc., Detroit, Mich., not only provides a highly efficient means of



starting the engine quickly in cold weather, but also causes no inconsiderable saving in storage battery mainte-



nance as well as wear and tear of the starting motor.

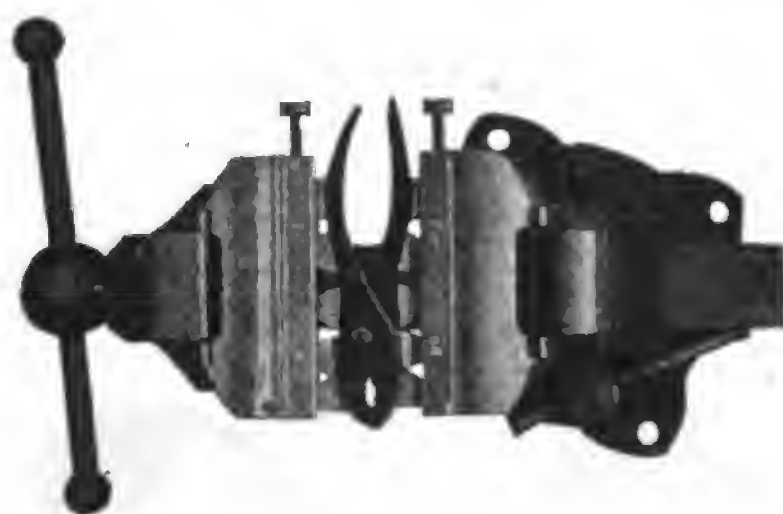
Although designed for use with cars

or trucks equipped with electric starting and lighting outfits, it may be used just as readily on commercial vehicles intended to be started by hand but equipped with magnetos for ignition instead.

Attached to the dash in a few minutes time it connects the fuel line with a special fitting on the intake manifold of the engine, forcing the priming charge directly into the combustion chamber in form of a fine, readily vaporized mist.

UNIVERSAL VISE ATTACHMENT.

The Universal Equalizer Co., Cincinnati, O., manufactures a vise attachment which appeals to service station repairers from the fact that irregular shaped



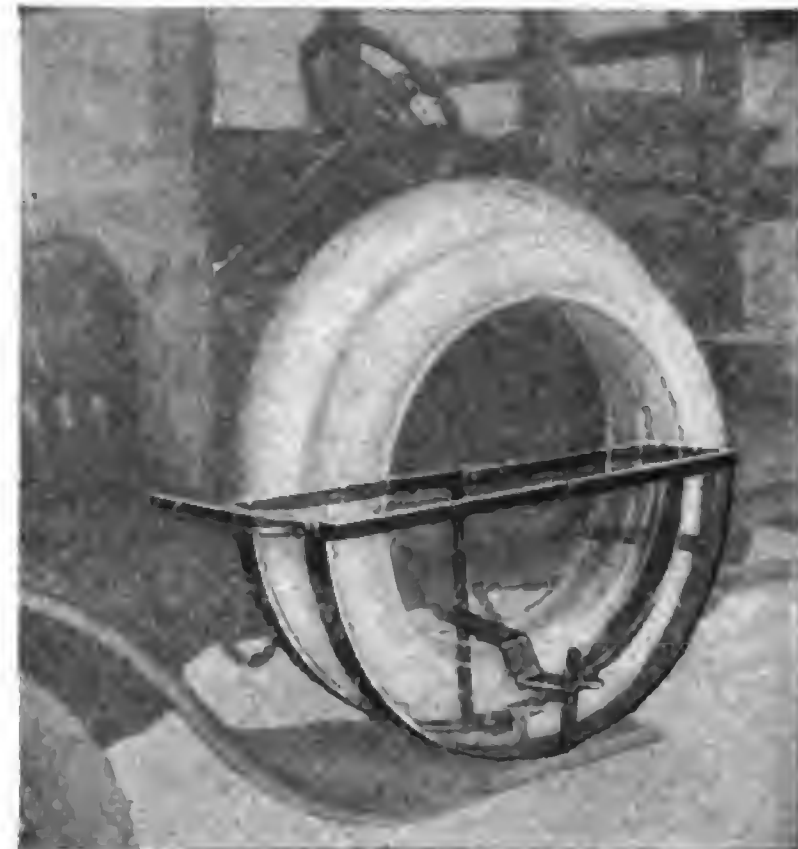
articles can be clamped between the jaws of any vise equipped with it, the manufacturer stating that the articles will be held as firmly as if a special type of vise were used.

SUPER-VISIBLE GASOLINE PUMP.

The Wayne Super-Visible Gasoline Pump, which has recently been placed on the market by the Wayne Oil Tank Co., Fort Wayne, Ind., is said to possess many distinctly new features of design and operation. The gasoline is contained in two glass receptacles correctly marked, and the dealer and customer are assured of exact measure by the Fort Wayne Five-Way Valve, which effectively prevents the return of any gasoline to the underground tank. The pump employs no motor, thus eliminating all danger of fire, and general economy of operation is gained by an exclusive device which automatically fills one container as the other empties.

HEAVY DUTY TIRE CARRIER.

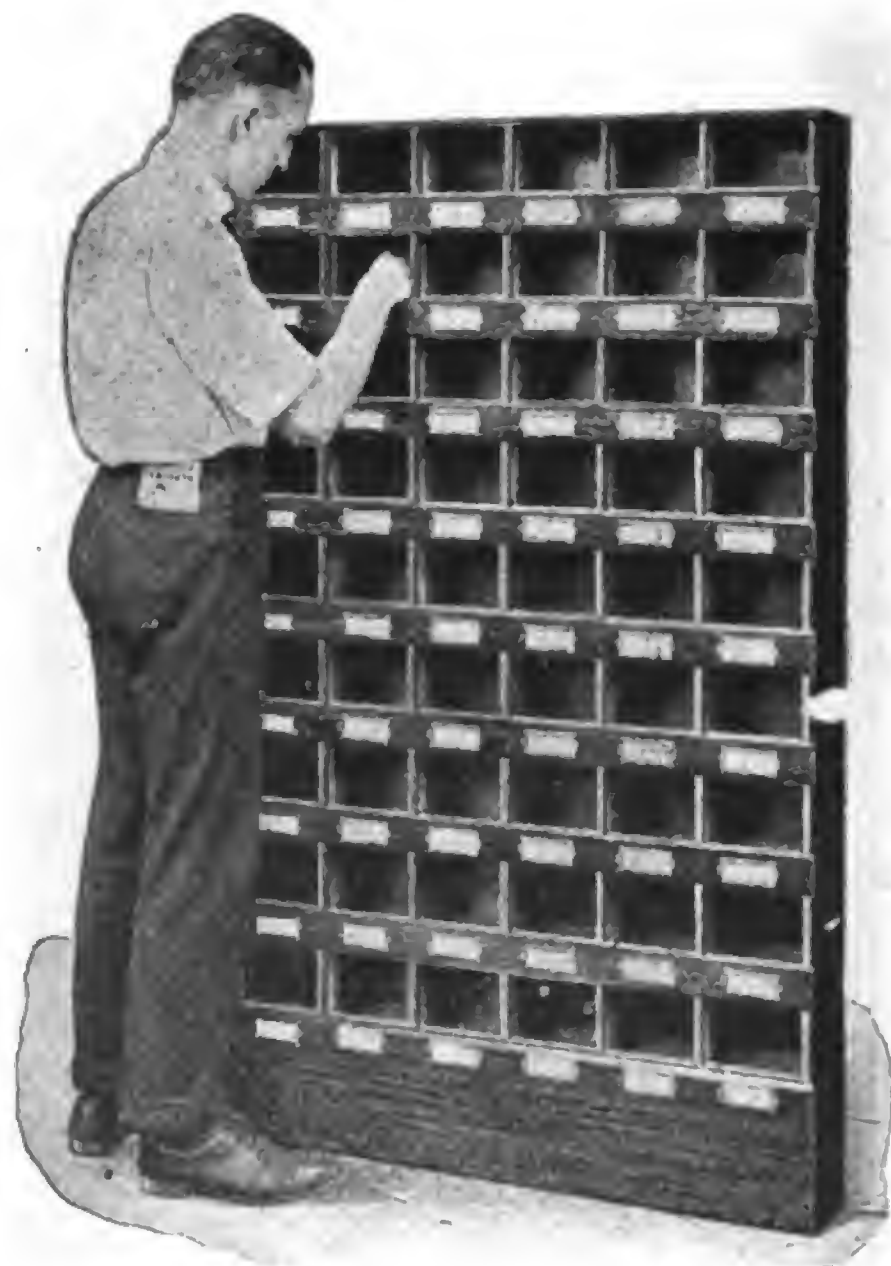
The Hastings Manufacturing Co., Hastings, Mich., is showing a new heavy duty type tire carrier for the Ford truck which is primarily designed to carry one 32 by 4 $\frac{1}{2}$ -inch tire or rim and 30 by 3 $\frac{1}{2}$ tire or rim, but the large side is easily adjustable to carry 33 by five-inch tire or



rim. The carrier is made exceptionally strong and is built to withstand rough service such as is found on a Ford truck. The carrier is equipped with a simple, thief proof locking device and is finished in high grade fired black enamel.

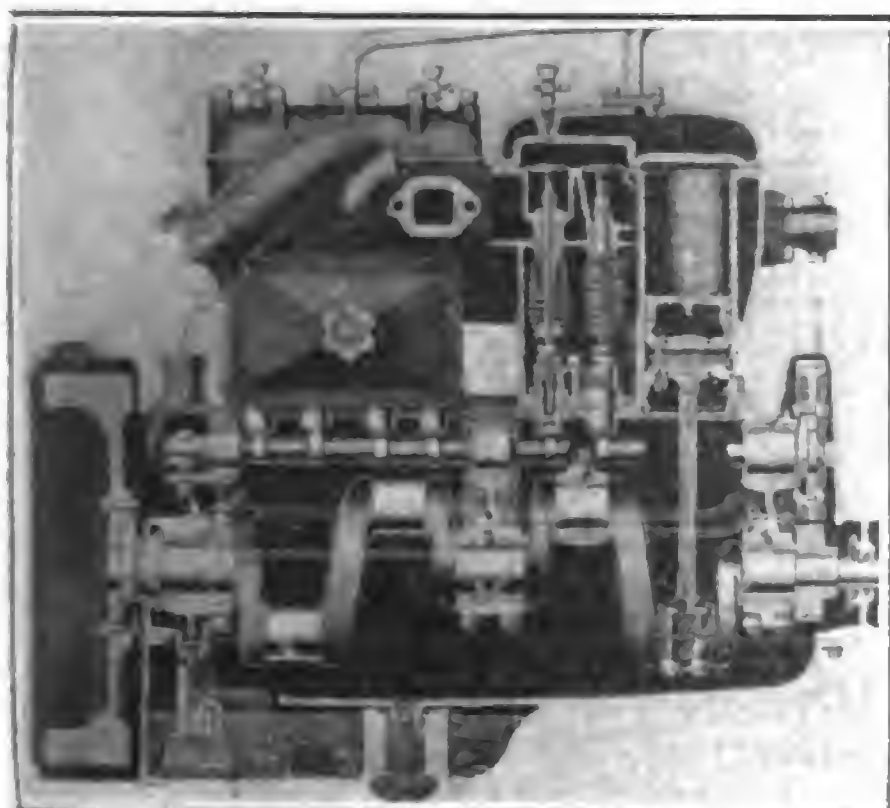
ONE-HALF SIZE STOCK AND ACCESSORY BIN.

Hobart Brothers Co., Troy, N. Y., manufactures a new bin for service station stock rooms called the Half-Size, which



has many labor saving features. The bin is well made of oak bound with steel, and can be used in sections or as a unit, as desired. New units may be purchased and added as needed. The compartments are six inches wide, six inches high and eight inches deep, with a specially designed hand entrance.

WAR-TESTED PRINCIPLES EMBODIED IN REDESIGNED U. S. TRUCKS



Sectional View Hinckley High Duty Engine Used in United States Motor Truck Models "R" and "S."

THERE was hardly an industry in the country that was not able to reap some benefit from the readjusted conditions brought about by the strenuous years of participation in the world war, and the wise manufacturer was the one who took advantage of these lessons.

Although during its 12 years of manufacturing existence the United States Motor Truck Co. of Cincinnati, O., had developed a type of heavy purpose motor vehicle that was pre-eminent in its class for efficiency and service yet, at the close of the war, the officials of the company decided to take advantage of the beneficial experiences gathered from the whole field of war transportation and more particularly from the construction of its own type of model B trucks to meet governmental requirements. It was accordingly determined, by both the executive and engineering departments, to redesign the line so as not only to retain all the fundamental excellencies of the original design that made the United States trucks dependable transportation units in the past, as well as embodying the best of all the improvements that had developed and come under observation during the war period.

The task was undertaken by E. C. Shumard, the company's chief engineer, and his assistant, R. W. Bond, and the new models they turned out won immediate recognition in the trade and transportation field. The redesigned line comprises trucks from $1\frac{1}{2}$ to six tons capacity, presenting many unusual features of interest, one of the principal points kept in view being the successful use of pneumatic tires in the place of solids at the option of the owner.

"Floating Power Plant."

In the original line of United States trucks, the "floating power plant" was one of the outstanding features, this consisting of the flexible mounting of the engine in a sub-frame formed of short channels resting on the main frame. In the new line the "floating" principle is still retained, though the sub-frame has been done away with, and the engine is

cradled between springs at the rear instead of forward as in the past.

Wider engine arms are used at the rear and the tips of these are held suspended between coiled springs, which in turn rest between brackets riveted rigidly to the main side frames of the truck. On each side are four of these coiled springs, two above and two below the engine arm, so that the engine may be said to practically "float" between them. The forward end of the engine is supported only at the center, being suspended from a cast cross member resting on brackets riveted to either side frame. This gives the flexible three-point suspension considered desirable to relieve the engine from all twisting strains as the truck passes over uneven ground. This change in construction now allows the use of an enclosure over the flywheel.

Construction Unit High Grade.

In general the chassis are constructed to a standard design, differing only in the dimensions of the parts, and the units include engines especially built for the United States Co. and built-in governors of the company's own design on the three larger models. Stromberg carburetors, Eisemann magnetos, long fine tube radiators, Brown-Lipe clutches and gearsets, Sheldon semi-floating axles and springs, Lavine steering gears and Schwarz wood wheels are used on all models. All models have the worm drive with the exception of Model N, which has the internal gear drive.

Much care has been directed toward the development of the assembly details and the claim is made that the chassis are extremely well balanced and have unusual endurance, and this is combined with comparatively light weight because of the high quality of materials. The units are very accessible for maintenance or restoration work and the chassis lubrication has been worked out with much thought.

Tread and Wheelbase Dimensions.

A description of the Model S chassis, the 7000 to 8000-pound capacity truck, will serve for all models, as the construction features are similar with the exception of Model N which, as has been stated, has the internal gear drive instead of worm. The standard wheelbase

is 168 inches and the tread is 62 inches for the front wheels and 66 inches rear. An option on wheelbases is offered of a shorter one of 150 inches or longer of 178. The length back of driver's seat standard is 156 inches; short, 126 inches; long, 180 inches.

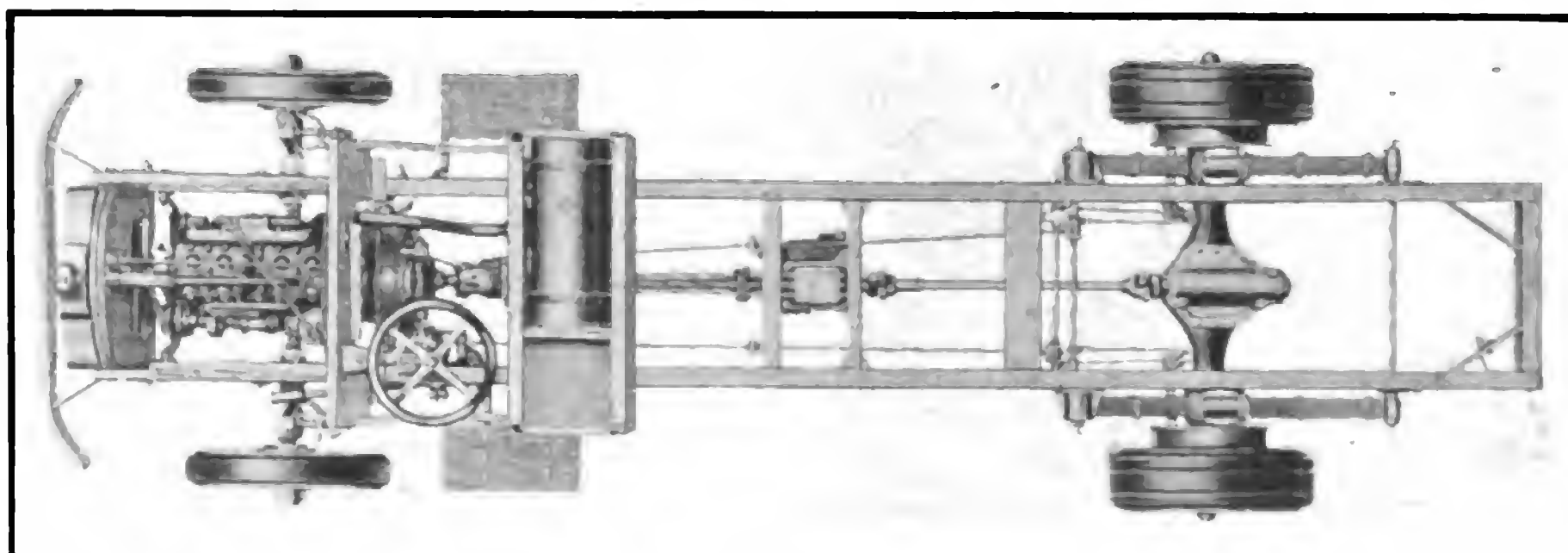
The standard wheelbase of Model T, 10,000 to 12,000 pounds capacity, is 172 inches, with option of shorter wheelbase of 162 inches or longer of 186 inches. Length back of driver's seat, standard, 168 inches; short, 138 inches; long, 192 inches. Tread, 62 inches front and $73\frac{1}{4}$ inches rear wheels.

The Model R, 5000 to 6000 pounds capacity, has a standard wheelbase of 156 inches, with option of shorter, 144 inches; or longer, 172 inches; body lengths back of driver's seat, standard, 144 inches; short, 120 inches; long, 168 inches. Tread, 60 inches, both front and rear.

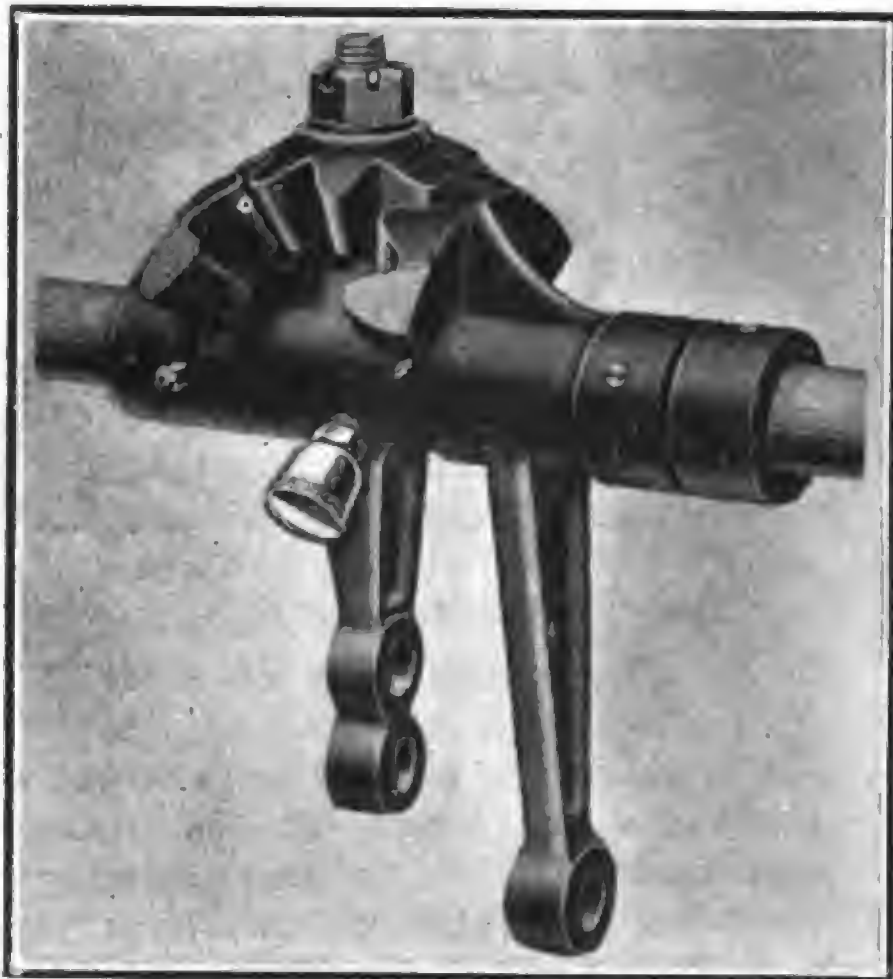
The capacity of Model NW, with solid tires, is 3000 pounds, and the wheelbase is 144 inches and the tread, 58 inches front and 57 inches rear. Model NP is the same as Model NW except that it is equipped with pneumatic tires and the capacity is increased to 4000 pounds. The standard wheelbase of Model N, solid tires, capacity 3000 pounds, is 144 inches. The length back of the driver's seat is 120 inches and tread, front, 58 inches; rear, 57 inches.

The Continental Engine.

The engine used in the two smaller chassis is the Continental N, $3\frac{3}{4}$ -inch bore and five-inch stroke, showing by the S. A. E. rating 22.50 horsepower. In the Model R truck a Hinckley engine is used with bore of four inches and stroke of $5\frac{1}{4}$ inches, developing an S. A. E. rating of 25.6 horsepower. The Model S truck is equipped with the same make of engine, having a bore of $4\frac{1}{2}$ inches and stroke of $5\frac{1}{2}$ inches, developing an S. A. E. rating of 32.4 horsepower. The Model T, the largest size truck, is equipped with a Buda ATU engine with a bore of $4\frac{3}{4}$ inches and stroke of $6\frac{1}{2}$ inches, developing an S. A. E. rating of 36 horsepower. The engines in all five models will easily develop a greater horsepower than that shown under the S. A. E. rating, in many instances giving



United States Model S Truck Illustrating Heavy Units of Construction.



Special Brake Linkage Equalizer Featured on All Models United States Motor Trucks.

an increase of from 25 to 30 per cent. on block test.

Unit power plants are used in the two smaller models with the cylinders cast en bloc. The three larger models have the cylinders cast en bloc with the transmission hung amidship. Centrifugal water pumps are used for water circulation in all models, with radiators having cast shell and fin tubes, while large sized fans at the fronts of the engines still further assist cooling.

Aside from the dimensions the principal difference between the three largest and two smallest sizes is that the first are equipped with four forward speed and reverse gearsets and the latter with three forward speed and reverse gearsets.

The principle difference between the two smaller trucks is that Model N is equipped with an internal gear drive axle and the NW truck with worm drive.

Heavy Duty Truck Type Engines.

The engines used are four-cylinder, four-cycle, L-head, water cooled type, with the cylinders cast en bloc, with the water jacket cast integral and the head separable in the three largest sizes and solid in the two smallest. The water chambers are large and formed to insure free circulation of the cooling medium. The pistons are fitted with three rings

each. The crankcases are in two sections, the upper halves carrying the main bearings and having forward and rear extensions that house the timing gearsets and flywheels. The lower sections are divided by horizontal plates that form the bases of the crank chambers and the tops of the oil reservoirs. They are fitted with plates on which the oil pumps are mounted so that the pumps may be removed for cleaning. Drainage plugs are also added. The crankshafts are the three-journal type, the journals and crankpins being of generous length, drop forged from special alloy steel, heat treated and ground. The camshafts are drop forged with the cams integral, and of three-journal construction. The connecting rods are heat treated steel drop forgings. The timing gears and shafts are large and the gears are wide faced. The main and crankpin bearings are bab-bitt metal in bronze shells and the camshaft bearings are bronze. The valve tappets of the two smallest and the 10,000-pound trucks are of the mushroom type, while those of Models R and S are of the roller type, with the valve mechanism fully enclosed on all models.

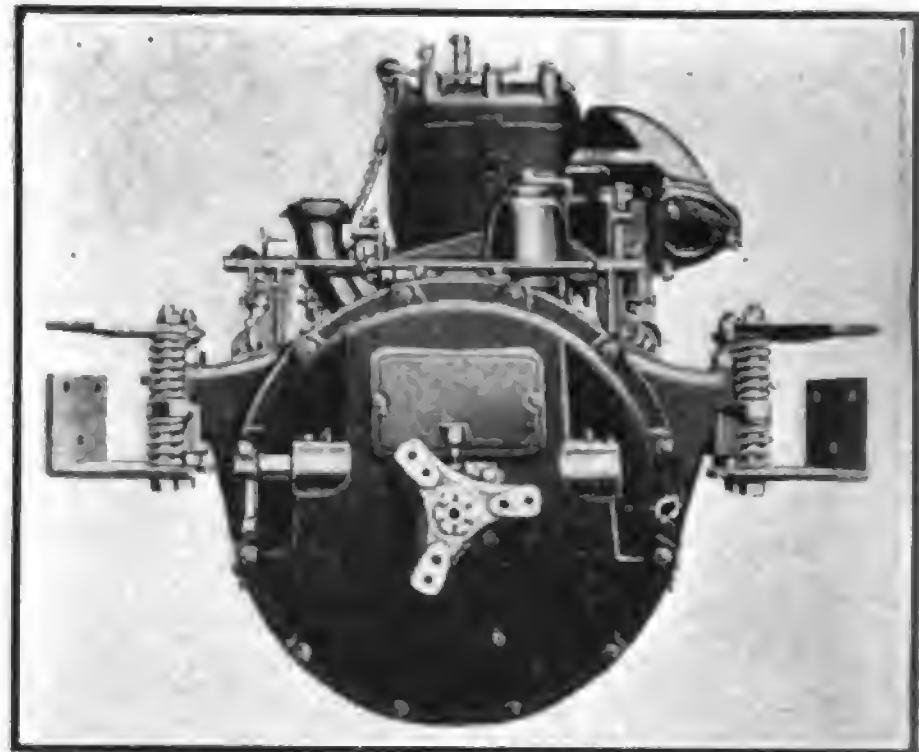
Engine Cooling and Lubrication.

The engines are lubricated by a full pressure system, the oil being drawn through filtering screens from intakes in the wells in the reservoirs, and forced by gear driven pumps through manifolds to the main and camshaft bearings and the timing gearsets, and from the main bearings, through drilled ducts in the crankshafts to the crankpins, thence through tubes to the wristpins. The oil thrown off by the centrifugal movement of the crankshafts is distributed to the cylinder and piston walls, the cams and valve tappets.

Power Transmission Systems.

The engines are equipped with governors of the company's own design, which have proved their worth through several years of use. The engines are connected through Brown-Lipe dry disc clutches and gearsets operating on roller and ball bearings of ample size and propeller shafts to the final drives.

The "floating" method of spring suspension at three points, which was retained, with the elimination of the sub-



Rear View of Engine, Showing Brackets, Springs and Method of Mounting on Frame.

frame features, keeps the engine always in line with the driving members, without the cramping of the engine units.

The main shaft is in two sections on all models. In the smaller sizes a bearing is provided at the center of the shaft to prevent whipping. In the larger models this bearing is eliminated, as the gearset is hung amidships, providing shorter shaft lengths, which obviate the possibility of whipping. Flexible, non-metallic universal joints are used between the clutch and gearset, and metallic joints between the gearsets and axle.

Attention is called to the special type of equalizer which is used in the brake linkage, this being a modification of the differential principle, which has worked out to the satisfaction of the manufacturer in past models.

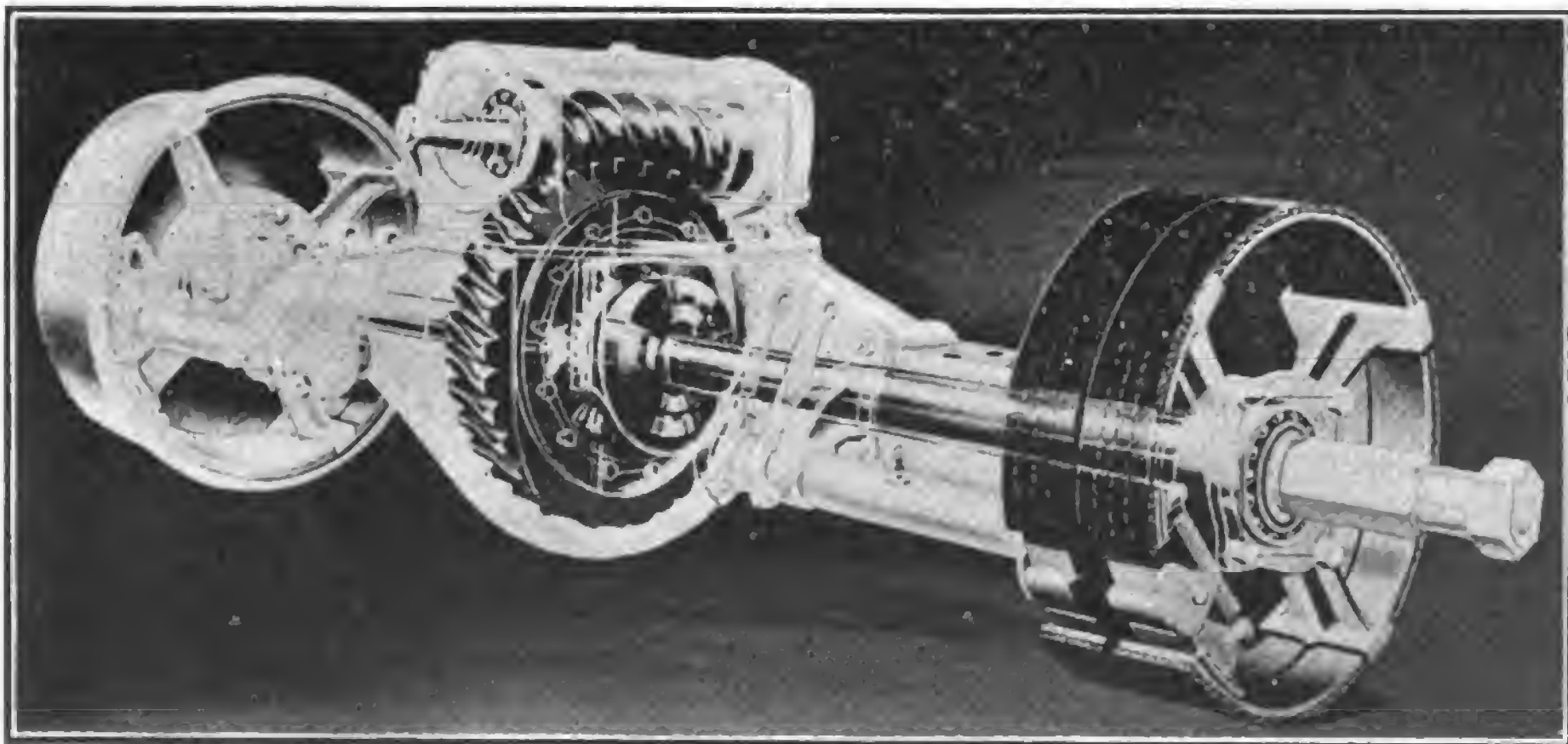
Other Constructional Details.

The Hotchkiss drive has been used on previous models, but the new spring mounting, designed to prevent any possibility of spring slippage, due to side or end thrust, is unique. There is a cup like depression pressed in each spring, making a protruding boss on the opposite or bottom side, which nests in the cup boss of the spring below. The bottom spring leaf fits into a depression in the base of the spring perch, and the spring cap has a boss fitting into the depression of the top spring. The spring perch is of a new, box type, with side plates, top and bottom, which are clamped to the axle by two heavy nickel steel clips, the whole, when tightened down, forming almost an integral part of the axle itself.

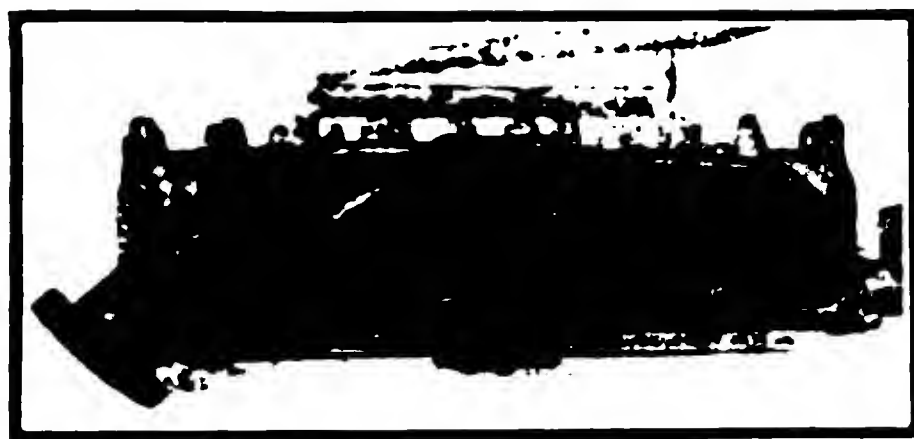
Each spring has four rebound clips. The two top leaves are bent around a bronze bushing which takes the spring bolt, and is ground to fit. The frame and cross members are all pressed steel, hot riveted.

Each truck is equipped with an enclosed metal cab, fitted with glass windows in the sides and doors that drop down, while a large glass window is provided in the back. A ventilating windshield is fitted to the dash and the whole forms a well lighted enclosure for the driver.

The seat is of metal fitted with double spring cushions of ample size, providing a comfortable seat for one or two persons besides the driver.



Phantom View Showing Units of Construction of Sheldon Worm Drive Axle Used in United States Motor Trucks.



The Famous Ram's Horn Hot Spot Manifold.

The wheels are regularly supplied with solid tires, although provision is now being made whereby pneumatics can be fitted at practically the same cost, provided this is specified when the truck is ordered. Steel wheels can also be obtained instead of wood if desired, and as these are made in several styles the purchaser has a wide choice.

The steering gear is a worm and nut type, this having been found from past experience to be best adapted to United States trucks, and it is constructed with heavy linkage and adequate provision is made for adjustment and lubrication. The control is conventional and the steering column is at the left side, with the spark and throttle levers on a quadrant under the rim of the steering wheel. The brakes are both internal expanding within drums on the rear wheels, and are fully enclosed.

The standard equipment includes driver's seat and cab, front fenders, running boards, heavy steel bumpers, tool boxes, kits of tools, jacks, oil dash and tail lamps.

Brief Specifications.

Brief specifications of the new line of United States motor trucks follow:

Models N and NW, 1½ tons, and NP, 4000 pounds: Four-cylinder, four-cycle, L-head engine, cylinders 3¾ by five inches, giving 25 horsepower at 1400 revolutions a minute. Frame, five inches deep; flanges, 2½ by ¼-inch thick steel. Speeds in miles per hour, 7.52 on first; 14.95 on second; 25.10 on third; 5.77 on reverse. Wheelbase, 144 inches. Length of driver's seat to end of frame, 120 inches. Chassis weight, 3800 pounds. Body weight allowed, 1050 pounds. Wood wheels standard.

Model R, 5000 to 6000 pounds capacity: Engine, four-cylinder, four-cycle, L-head type; bore, four inches by 5¼ inches stroke, giving 35 horsepower at 1200 revolutions a minute. Frame, six inches deep; flanges, 2¾ inches; thickness, ¼ inch. Speed in miles an hour, 3.61 on first, 6.07 on second, 9.8 on third, 17.3 on fourth, 3.05 on reverse. Wheelbase, 156 inches. Length of driver's seat, 144 inches to end of frame. Chassis weight, 5200 pounds. Body weight permitted, 1350 pounds. Wood wheels standard.

Model S, 7000 to 8000 pounds capacity: Engine, four-cylinder, four-cycle, L-head type, having bore of 4½ inches by stroke of 5½ inches, giving 42 horsepower at 1200 revolutions a minute. Frame, seven inches deep, with 3-inch flange of steel ¼-inch thick. Speed in miles an hour, 2.59 on first, 4.43 on second, 7.10 on third, 12.5 on four, 2.16 on reverse. Wheelbase,

168 inches. Length of driver's seat to end of frame, 156 inches. Chassis weight, 7000 pounds. Body weight permitted, 1600 pounds. Wooden wheels standard.

Model T, 10,000 to 12,000 pounds capacity: Engine, four-cylinder, four-cycle, L-head type, having bore of 4¾ inches by stroke of 6½ inches, developing 54 horsepower at 1200 revolutions a minute. Frame, nine inches deep, with 3¼-inch flange of steel ¼-inch thick. Speed in miles an hour, 2.07 on first, 3.88 on second, 6.89 on third, 11 on fourth, 1.71 on reverse. Wheelbase, 172 inches. Length of driver's seat to end of frame, 168 inches. Chassis weight, 9200 pounds. Body weight allowed, 1800 pounds. Steel wheels standard.

COURSE IN TRANSPORTATION.

Automotive transportation has been added to the regular course in industrial engineering at New York university beginning with the February term according to an announcement made by Dean Charles H. Snow of the University School of Applied Sciences. The course will have more to do with the application of the motor truck than the mechanics of it.

This course is the first of its kind to be given by any university in connection with industrial study and will include the following lectures: "The Future of the Motor Truck," "Motor Truck Operating Costs," "Motor Trucks vs. Horses," "Motor Trucks vs. Railroads, Trailers and Semi-Trailers," "Special Bodies," "Loading and Unloading Devices," "Scheduling, Routing and Dispatching," "Maintenance and Garaging," "Hiring, Training and Retaining Drivers."

Most of the standard makes of motor trucks are on display at the automobile show to be held at the State Armory, Hartford, Conn., Feb. 12-19. It will be the biggest show ever given in that city and will compare with the larger shows given throughout the country.

GOOD ROADS CONGRESS.

"The Relation of Highway and Motor Transport Development to Education," was one of the leading subjects discussed at the good roads congress and machinery exposition held at the Coliseum, Chicago, Feb. 8-12. The subject was presented by Prof. C. J. Tilden, national director of highways and highway transport education, Washington, D. C., one of the foremost leaders in the good roads movement. Governor Small, Mayor Thompson and a host of road specialists addressed the gathering.

Both the congress and show was held in the Coliseum. Forty thousand square feet of floor space was devoted to the show, which surpassed in the number and variety of its exhibits any of those held heretofore.

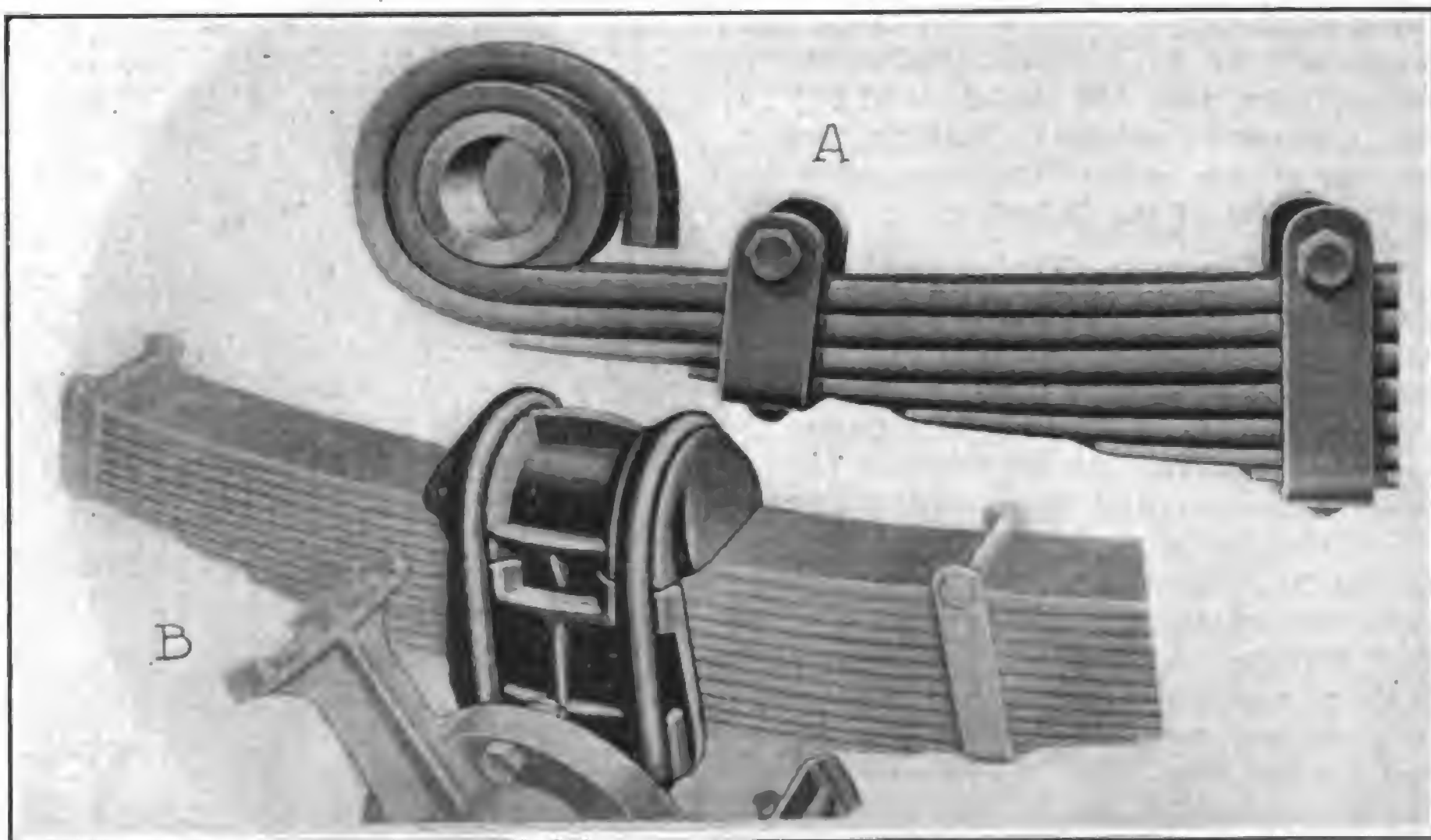
A feature was an extensive exhibit by the Division of Tests, Bureau of Public Roads, Washington, D. C. The division demonstrated impact tests on wet and soft subgrades, and on dry, hard and compact subgrades. Six-inch and eight-inch concrete slabs, 10 feet square, were used in the demonstrations. There was also a demonstration of subgrade investigations.

MAKING KELLY TRUCKS.

A. K. Sewart of the Hare's Motors Corporation, formerly with the Packard Motor Car Co., has taken the reins as manager of the Kelly Springfield Motor Truck Co., Springfield, O. Production is gradually increasing at this plant.

BOLAND WITH ARMLEDER.

Edmund T. Boland, formerly works manager of the Kissel Motor Car Co., Hartford, Wis., and more recently in charge of operations of the Clintonville (Wis.) Tractor Co., has become associated in a similar capacity with the Theodore Armleder Co., manufacturer of Armleder motor trucks.



A. Large Bronze Bushing in Coiled Ends of Spring Leaves on U. S. Trucks Provide Against Excessive Wear of Pins. B. Special Cast Spring Blocks and Side Pieces Keep Springs Firmly in Place on Axle Housing Pads.

BANNER TRUCK EXHIBIT OF YEAR AT BOSTON SHOW

More Than Twice As Many Power Vehicles on Display Than At New York Event—Space Taken for 57 Makes and 236 Motor Truck Models—Influx of Buyers In Throng Certain to Attend—Counted on by Industry to Produce Active Market.

THE truck industry is centering its undivided attention on the Boston Automobile Show, March 12-19, in the belief that the event will mark the line of cleavage between little business and big business.

All display space for this exhibit was contracted for weeks back, which is the strongest indication that the merchandisers of motor vehicles view the sales pushing power of this show with brimming confidence. Not only was all the exhibition space taken, but the plea of scores to show their wares was refused for lack of accommodation, this despite the fact that the show is staged in Mechanics' building, New England's largest exposition building. A closed car show in the ball room of the Copley Plaza hotel will help relieve the situation.

The management announces that 57 makes of trucks, embracing 236 models, will be shown. Of these, the Rainier, Lansden, Facto, Old Hickory and Ajax will be exhibited for the first time in Boston.

The motor truck department will have an unusually large and varied display. Every kind of a body used for commercial purposes, with the latest and most efficient methods of loading and unloading, will be shown.

There will be 87 different makes of passenger cars, with 350 models, and 358 motor accessory exhibits, making the event one of the largest and most complete in the life of the industry.

Big Accessory Display.

The accessory display, according to Manager Chester I. Campbell, will be the largest and most comprehensive in the history of the Boston show. Manager Campbell has given this department his personal attention and has weeded out many of the "wrinkles" that he regarded as "unfit." He has striven to accept only such accessories that are of the highest calibre. As a result of his efforts there are a number of new equipment manufacturers who will show in Boston for the first time. The great majority of the exhibitors in this department are manufacturers who are members of the Motor Accessory Manufacturers' Association.

"This is not the time to boast," says Manager Campbell, "but the extraordinary demand for space indicates that the entire motor industry is looking toward New England to give the first sign of returning prosperity. The dealers all over New England apparently have the same view, for hundreds of them have written in asking our organization to make hotel reservations for them. All of these signs indicate to me that 'show week' in Boston is going to attract a big crowd."

Trucks in Basement.

The truck display will be in the basement and will be easily the largest truck show of the year anywhere. More than twice as many makes of trucks and more than twice as many models as were on exhibition at the New York show will be seen.

Many of the trucks will be completely rigged out, equipment including bodies, pneumatic tires and every necessary accessory. The special bodies will comprise many for farm use, including the convertible type, some of which may be changed over for use in eight different carrying capacities.

In addition to gasoline trucks, there will be a number of electric trucks on

display, together with quite a few tractors, trailers and semi-trailers.

This will be the 19th annual Boston Automobile Show and the organizations directing it, the Boston Automobile Dealers' Association, Inc., and the Boston Commercial Motor Vehicle Association, Inc., have yet to score a failure. There are many signs that would suggest that the coming exhibit will be from every standpoint the banner event under their auspices.

New England is a wonderful market for the motor truck. There are over 100,000 now in use in the six states. The utility of the power vehicle has been demonstrated in this field through services rendered. The textile and shoe industries, leaders in this territory, are hitting a stronger stride toward normal production every day. By show time these industries will be in the last stages of recuperation and well nigh recovered from the depression period.

A Buyer's Show.

Of the tens of thousands of visitors to the Boston show a large quota will be prospective buyers of dependable freight transportation. There will be hundreds of others who could use trucks if their utility, their efficiency and their economy were brought home to them. The Boston show will be a selling event beyond question. It has the requirements to put the industry on its feet, if the opportunity is properly grasped by those who have the future of the trade in their keeping.

Mechanics' building, the site of the show, located on Huntington avenue, has 105,000 square feet of exhibition space. From end to end it will provide interest, education and enlightenment for those who want to learn what is new or improved in automotive equipment. The decorations, for which the event is noted, will be on a larger and more artistic scale than ever.

There will be band and orchestral concerts and other features to add life and lustre to the exhibition.

The dates of the show allow two Saturday displays, an important feature in New England, where this day is a half-holiday. The show will be open day and evening.



Chester I. Campbell, Manager, Boston Automobile Show.

Partial List of Exhibitors at Boston Automobile Show

Space	Name	Address	Space	Name	Address
505	Able Manufacturing Co.	San Francisco, Cal.	417	Detroit Pressed Steel Co.	Detroit, Mich.
33	Acker, Inc., Edward G.	Boston	413	Dickerson, C. A.	Chicago, Ill.
548-549	Acme Die Casting Corp.	Brooklyn	732-733	Dixie Flyer Car.	Boston
205-209 Inc. & 212	Acme Truck	Boston	108-109	Dodge Brothers Car.	Boston
300	Ajax Motor Sales Co.	Boston	301-302	Dodge Brothers Truck	Boston
300	Ajax Trucks	Boston	111-112	Donovan Motor Car Co.	Boston
526	Alemite Lubricator Co. of N. E.	Bridgeport	30-31	Dorris Car.	Boston
424	American Car.	Boston	138	Dort Car.	Boston
506-507	American Chain Co., Inc.	Bridgeport	515	Double Seal Ring Co.	Chicago, Ill.
606	American Mutual Liability Insur. Co.	Boston	702	Duby, John F.	Mattapan, Mass.
405	American Storage Battery Co.	Boston	148-149	Dunbar-Sanders, Inc.	Boston
146	Anthony & Co., F. P.	Boston	201-202	Duplex Truck	Boston
522	Apco Manufacturing Co.	Providence, R. I.	428	Dupont Car.	Boston
503	Apollo Magneto Corp.	Kingston, N. Y.	134-135-136	Dutton Motor Co., F. A. W.	Somerville, Mass.
605	Arrow Grip Mfg. Co.	Glens Falls, N. Y.	445-446	Dyer Co., The	Cambridge, Mass.
412	Ashton-De Vere, Inc.	Boston			
340-341-342	Atlas Truck	Boston	717	Eagle Oil & Supply Co.	Boston
134-135-136	Auburn Car.	W. Somerville, Mass.	333	Eastern Electric Vehicle Co.	S. Boston
323-324-325-326	Autocar Sales and Service Co.	Boston	726	Economy Timer Co.	Norwalk, Conn.
323-324-325-326	Autocar Truck	Boston	628	Eggleson Supply Co.	Boston
605AA	Automatic Air Cushion Co., The	Boston	147	Elcar Car.	Boston
700	Automatic Safety Signal Co.	Portland, Me.	546-547	Electric Storage Bat. Co., The	Philadelphia
602	Automobile Legal Association	Boston	125-126-127B	Essex Car.	Boston
620	Automobile Mutual Fire Ins. Co.	Boston			
621	Automobile Mutual Liability Ins. Co.	Boston	339	Facto Motor Truck	Springfield, Mass.
517	Automotive Gear Works	Atlanta, Ga.	339	Facto Truck	Springfield, Mass.
			29	Falk-Baker Co.	Boston
228AA-229AA	Babcock Sales Co.	Boston	117-118-132-229-		
309-310	Baker Co., Inc., Day	Boston	230-231	Fay-Allen Co., C. E.	Boston
336-337-338	Baker Motor Sales Co., Inc.	Boston	232-234 Inc.	Federal Trucks	Cambridge, Mass.
	Bassick Mfg. Co., The	Chicago, Ill.	426A	Fiat Car.	Boston
14-18	Beacon Motor Car Co.	Boston	528	Flentje, Ernst	Cambridge, Mass.
439	Bearings Specialty Co.	Boston	447	Flexlume Sign Co.	Buffalo, N. Y.
22-23	Becker-Stutz Automobile Co.	Boston	231-732-733	Flynn Motor Sales Co.	Boston
303-304	Beeman Garden Tractors	Boston	100-101	Ford Car.	Cambridge, Mass.
30-31	Biddle Car.	Boston	100-101-305	Ford Motor Co.	Cambridge, Mass.
524	Biflex Products Co.	Waukegan, Ill.	305	Ford Truck	Cambridge, Mass.
608	Blanchard, H. H.	Boston	406	Franklin, M.	Boston
704-705	Boston Auto Top Co.	Boston	7-11	Franklin Car.	Boston
411	Boston Blacking Co.	East Cambridge	7-11	Franklin Motor Car Co.	Boston
140-144 Inc.	Boston Buick Co.	Boston			
139-145-307	Boston Oldsmobile Co.	Boston	616-617	Gardner Car.	Boston
5-9	Bowman Co., J. W.	Boston	318-319-320	G. M. C. Truck	Boston
24-25	Brewster Car.	Boston	545	Giant Grip Mfg. Co.	Oshkosh, Wis.
137	Brisco Car.	Boston	600	Gill Piston Ring Co.	Boston
243-250	Brisco Truck	Boston	426B	Grant Car.	Boston
531-532	Brooks-Skinner Co., Inc.	Weymouth, Mass.	711	Greb Co., Inc., The	Boston
220-221-220AA-			540	Greene & Swett Co.	Boston
221AA	Buda Co., The	Harvey, Ill.	725	Greist Mfg. Co., The	New Haven, Conn.
140-144 Inc.	Buick Car.	Boston	343	Guaranty Motors Co.	Cambridge, Mass.
435	Bunting Brass and Bronze Co., The	Toledo, O.	434	Guaranty Truck	Cambridge, Mass.
601	Burditt & Williams Co.	Boston	30-31	Guertin-De Rochemont Co.	Boston
527	Burton-Rogers Co.	Boston			
232-233-234	Boston Federal Truck Co.	Cambridge	632	Hall Motor Co.	Boston
			728-729	Hanson Car.	Boston
2	Cadillac Automobile Co. of Boston	Boston	13-17	Hares Motors of N. E.	Boston
440	Cadillac Automobile Co. of Boston	Boston	401	Harnett Lubricating Co.	Boston
2	Cadillac Car.	Boston	201-202	Harper-Libby Co., Inc.	Boston
3	Caldwell, Inc., Frederick J.	Boston	441	Harriman Co., The J. P.	Boston
614	Campbell Co., A. S.	East Boston	26-27-28	Hart Co., A. T.	Boston
544	Campbell Motors Corp.	Boston	508	Hartford Inc., Edward V.	New York
24-25	Canterbury, Inc., George W.	Boston	418	Hassler, Inc., Robert H.	Indianapolis, Ind.
719	Carleton Co., The	Boston	38	Haynes Car.	Boston
414	Carroll Mfg. Co.	Arlington	26-27-28	H. C. S. Car.	Boston
611	Central Automobile Tire Co.	Boston	125-126-127B	Henley-Kimball Co.	Boston
117-118-132	Chalmers Car.	Boston	150	Hennigan, Inc., Walter B.	Boston
502	Champion Ignition Co.	Flint, Mich.	108-109-301-302	Henshaw Motor Co.	Boston
430	Champion Spark Plug Co.	Toledo, O.	121-122B	Hinchcliffe Motor Co.	Boston
122A-123-124	Chandler Car.	Boston	442-443	Hillman Auto Supply Mfg. Co.	Boston
122A-123-124	Chandler Motors of N. E.	Boston	340-341-342-728-		
115-116-308	Chevrolet Car.	Boston	729	Holland System, Inc., Trading Corp.	Boston
115-116-308	Chevrolet Motor Car. of N. E.	Boston	618	Holmes Car.	Boston
215-216-217-215A-			618	Holmes Motors Inc.	Boston
216A-217A	Clark Equipment Co.	Buchanan, Mich.	710	Houdaille Shock Absorber Co.	E. Cambridge
708	Carlisle-Ayer Co.	N. Boston	444	Howe & Co.	Boston
303-304	Cletrac Tractors	Boston	125-126-127B	Hudson Car.	Boston
122A-123-124	Cleveland Car.	Boston	632	Hupmobile Car.	Boston
340-341-342	Clydesdale Truck	Boston			
36-37	Cole Car.	Boston	235-236	International Harvester Co. of America	Somerville, Mass.
113	Columbia Car.	Allston, Mass.	235-236	International Truck	Somerville, Mass.
542-543	Connell Co., W. J.	Boston			
129-130-131	Connell & McKone Co.	Boston	554-555	Jackson Electric Co.	Boston
709	Copthorn Mfg. Co.	Boston	427-603	Jackman-Jameson Motor Co.	Boston
500-501	Coward Auto Supply Co.	Boston		Jefferson Forge Products Co., The	Detroit, Mich.
415	Crew-Levick Co.	Cambridge, Mass.			
333	C-T Electric Truck	S. Boston	344	Johnson, Arthur G.	Cambridge, Mass.
329	Cunningham Harse and Ambulance	Boston	121-122B	Jordan Car.	Boston
4	Cunningham Car.	Boston	303-304	"J. T." Tractor	Boston
4-329	Cunningham Son & Co., James	Boston	346AA	Johnson, Henry L.	Boston
703	Curtis Pneumatic Machinery Co.	St. Louis, Mo.			
5-9	Daniels Car.	Boston	437AA	"Kant-Rust" Products Corp.	New York
410	Davis Chemical Mfg. Co.	Brockton, Mass.	330-331-332	Kelly-Springfield Motor Truck Co.	Boston
620	Davis-Lyon Storage Battery Co.	Lynn, Mass.	330-331-332	Kelly-Springfield Truck	Boston
631	Davis-Watson Mfg. Co.	Nashua, N. H.	425B	Kelsey Car.	Boston
409	De-Lite Mfg. Co.	Dorchester, Mass.	425B	Kelsey Motor Co.	Boston
560	Derf Mfg. Co., Inc., The	New York	504	Kelso Mfg. Co.	Trenton, N. J.

Space	Name	Address	Space	Name	Address
147	King Car.....	Boston	263-268 Inc.	Pierce-Arrow Truck.....	Boston
147'	King Motors, Inc.....	Boston	730-731	Premier Car.....	Boston
269-270-271	Kress & Son, O. F.....	Lawrence, Mass.	607	Pressure Proof Piston Ring Co.....	Boston
718	Kwix Co.....	N. Boston			
105-106-107	La Fayette Car.....	Boston	243-250	Rainier Truck.....	Boston
205-209 Inc. & 212	Lally & Sons Co., Eugene F.....	Boston	32	R & V Motors of N. E.....	Boston
407	La-Lo Chemical Co.....	Providence, R. I.	32	R. & V. Knight Car.....	Boston
408	Lambert Trublruf Tire Co.....	Boston	104	Rauch Lang Car.....	Boston
309-310	Lansden Truck.....	Boston	428	Reed Motor Car Co.....	Boston
707	Larco Wrench Mfg. Co.....	Chicago, Ill.	119-120	Reo Car.....	Boston
253-254	Lebon-Kidd Co., The.....	Boston	321-322-327-328	Reo Truck.....	Boston
616-617	Leghorn, G. M.....	Boston	253-254	Republic Truck.....	Boston
400	Lewis Tool Mfg. Co.....	Boston	626	Rimco Lubricator Co., Inc.....	Boston
34-35	Lexington Automobile Co.....	Boston	102-103	Roamer Car.....	Boston
34-35	Lexington Car.....	Boston	509	Robe Rail Sales Corp.....	New York
616-617	Liberty Car.....	Boston	105-106-107-315-316-317	Rockwell, Inc., C. P.....	Boston
321-322-327-328-119-120	Linscott Motor Co.....	Boston	104	Rommelfanger, N.....	Boston
13-17	Locomobile Car.....	Boston	113	Ross, Inc., R. R.....	Allston, Mass.
438	Lovejoy Mfg. Co.....	Boston	38	Russell Co., W. L.....	Boston
550-551-552	Luthy Storage Battery Co.....	New York			
15-19	MacAlman Co., J. H.....	Boston	229-230-231	Sanford Truck.....	Boston
306	MacBride & Co., Inc., George W.....	Boston	720-721-722	Sargent & Ham Co.....	Boston
256-257-258-259	Mack Motor Truck Co.....	Cambridge, Mass.	29	Saxon Car.....	Boston
256-257-258-259	Mack Truck.....	Cambridge, Mass.	420	Schrader's Son, Inc., A.....	Brooklyn
16-20 & 263 to 268 Inc.	Maguire Co., J. W.....	Boston	151	Scripps Booth Car.....	Boston
448-449	Maibohm Car.....	Boston	151	Scripps Booth Motor Car Co.....	Boston
539	Malay Rubber Co., The.....	Cleveland, O.	336-337-338	Selden Truck.....	Cambridge, Mass.
12	Malton Specialty Co.....	Boston	240	Sewell Cushion Wheel Co.....	Boston
448-449	Mann Motor Car Co.....	Boston	36-37	Smith & Sons Co., Bryant G.....	Boston
434	Marko, Paul M. & Co., Inc.....	Brooklyn	303-304	Sowers Tractor and Implement Co.....	Boston
8-12	Marmon Car.....	Boston	234-335	Springfield Commercial Body Co.....	Cambridge
42613	Martin-Brackett Co.....	Boston	110	Standard Car.....	Boston
222-222AA-223	Martin-Perry Corp.....	Boston	431	Standard Oil Co. of N. Y. (N. E. Dept.), Boston	
712	Marvel Carburetor Sales Co. of N. E.....	Boston	110	Standard Steel Motor Car Co.....	Boston
214	Masden Mfg. Co.....	Boston	525	Standard Thermometer Co.....	Boston
345-346	Maxim Motor Co.....	Middleboro, Mass.	21	Stanley Car.....	Newton, Mass.
345-346	Maxim Truck.....	Middleboro, Mass.	610	Stanley Co., Inc., John T.....	New York
117-118-132	Maxwell Car.....	Boston	21	Stanley Motor Carriage Co.....	Newton, Mass.
229-230	Maxwell Truck.....	Boston	15-19	Stearns-Knight Car.....	Boston
146	McFarlan Car.....	Boston	340AA	Steel Products Equipment Co.....	Boston
510	McQuay-Norris Mfg. Co.....	St. Louis, Mo.	150	Stephens Car.....	Boston
13-17	Mercer Car.....	Boston	237-238-239	Sterling Motor Truck Co. of N. E.....	Boston
2AA	Middlesex Motor Car Co.....	Boston	237-238-239	Sterling Truck.....	Boston
706	Miles Piston Ring Co.....	Boston	24-25	Stevens-Duryea Car.....	Boston
512-523	Mills Cabinet Co.....	Racine, Wis.	311-314 Inc.	Stewart Automobile Corp.....	Boston
402-403	Minard Co.....	Framingham, Mass.	311-314 Inc.	Stewart Truck.....	Boston
114	Mitchell Car.....	Boston	111-112	Studebaker Car.....	Boston
114	Mitchell-Lucas Motor Co.....	Boston	22-23	Stutz Car.....	Boston
2AA	Monroe Car.....	Boston	513-514	Sunderman Corp.....	Newburgh, N. Y.
610A	Montello, V.....	Medford, Mass.			
615	Moon Car.....	Boston	3	Templar Car.....	Boston
416	Moreton Corp., Walter H.....	Boston	422	Texas Co., The.....	Boston
102-103	Morse Co., Alfred Cutler.....	Boston	556	Tide Water Oil Sales Corp.....	Boston
724	Morse, L. J.....	Springfield, Mass.	563-564	Tonneau Shield Co., Inc.....	New York
557	Mosler & Co., A. R.....	Mt. Vernon, N. Y.	226-227	Traffic Truck.....	Boston
538	Motor Accessories, Inc., John & Arthur.....	Boston	226-227	Traffic Truck Sales Corp.....	Boston
536	Motor Parts Co.....	Boston	518-519	Trexler Co.....	Philadelphia
516	Motor Vehicle Publishing Co.....	New York	615	Triangle Motors Co.....	Boston
269-270-271	Municipal Truck.....	Lawrence, Mass.	315-316-317	Troy Trailor.....	Boston
			426A	Turin Motors, Inc.....	Boston
105-106-107	Nash Car.....	Boston			
315-316-317	Nash Truck.....	Boston	344	Ultimate Truck.....	Cambridge, Mass.
26-27-28	National Car.....	Boston	537	Underhay Oil Co.....	Boston
224-225	Netco Truck.....	Fitchburg, Mass.	218-219	U. S. Air Compressor Co.....	Cleveland, O.
228	New Britain Mch. Co., The.....	New Britain, Conn.	627	U-Sav-Your Mfg. Co.....	Warren, Mass.
228	New Britain Tractor.....	New Britain, Conn.	128	Utterback-Gleason Co.....	Boston
424	New England Amer. Motor Car Corp.....	Boston			
224-225	New England Truck Co.....	Fitchburg, Mass.	432-433	Vacuum Oil Co.....	New York
137-243-250	New England Velle Co.....	Boston	137	Velle Car.....	Boston
511	New Era Spring and Specialty Co., South Grand Rapids, Mich.		243-250	Velle Truck.....	Boston
437	New York Lubricating Oil Co.....	Boston	423	Vulcan Motor Axle Corp.....	Detroit, Mich.
436	No-Leak-O Piston Ring Co.....	Baltimore, Md.			
33	Noma Car.....	Boston	260-261-262	Walker Electric Truck.....	Boston
318-319-320	Noves-Buick Co.....	Boston	260-261-262	Walker Vehicle Co.....	Boston
619	Nutter Electric Equipment Co.....	Boston	624	Ward's Sons Co., Edgar T.....	Boston
148-149	Oakland Car.....	Boston	425A	Waterman, George H.....	Boston
231	Old Hickory Truck.....	Boston	529-530	Weaver Mfg. Co.....	Springfield, Ill.
139-145-307	Oldsmobile Car.....	Boston	730-731	Wells Motor Co.....	Boston
309-310	Onelda Truck.....	Boston	427	Westcott Car.....	Boston
129-130-131	Overland Car.....	Boston	521	Westinghouse Air Spring Co., The.....	Boston
1-241-242-251-252	Packard Motor Car Co. of Boston.....	Boston	561-562	Westinghouse Union Bat. Co.....	Swissvale, Pa.
1	Packard Car.....	Boston	429	White & Bagley Co., The.....	Worcester, Mass.
241-242-251-252	Packard Truck.....	Boston	244-249 Inc.	The White Co.....	Boston
127A-128	Paige Car.....	Boston	244-249 Inc.	The White Truck.....	Boston
127A-128	Paige-Detroit Co. of N. E.....	Boston	629	Whittredge Portable Steel Bldgs. Co.....	Boston
609	Parker, Earl K.....	Boston	723	Wight, Austin J.....	Boston
14-18	Peerless Car.....	Boston	558	Willard Storage Bat. Co., The.....	Cleveland, O.
541	Perrine Co.....	Boston	129-130-131	Willys-Knight Car.....	Boston
306	Phenix Truck.....	Boston	534-535	Wilson Co., John V.....	Boston
16-20	Pierce-Arrow Car.....	Boston	553	Wilson, K. R.....	Buffalo, N. Y.
			8-12	Wing Co., F. E.....	Boston
			625	Winsor & Son, Alfred.....	Boston
			6-10	Winton Car.....	Boston
			6-10	Winton Co., The.....	Boston
			421	Wire Wheel Corp. of America.....	Buffalo, N. Y.
			727	Wire Wheel Service, Inc.....	Boston
			404	Wright "Name-On" Robe Co.....	Waterville, Me.

Unwearable Trucks Triple Operating Zone

Fleet of 58 Power Haulers, Backed by Skilled Service, Has Been Dominating Factor in Upholding the Prestige, Maintaining Reliability, Adding to the Clientele and Increasing the Profits of the Widely-Known and Long-Established House of S. S. Pierce Co., Boston, Mass.

Sturdy trucks so well cared for that the owner wonders if they "will ever wear out."

Trucks so dependable that not a single delivery to the firm's thousands of customers was missed last winter when the worst storms in 30 years raged.

Trucks so rugged that not one of a half hundred was laid up in garage or service station throughout the worst storm of that record winter.

Trucks, a considerable number of which have traveled over 50,000 miles and look as good and act as good as new.

Trucks which go 10 miles on a gallon of gasoline under right conditions.

Trucks, which have displaced hundreds of horses, tripled the operating zone of a big concern and are doing work which railroads or horses could not begin to match in speed or efficiency.

These business-expanding, time-saving, economical carriers are operated by the S. S. Pierce Co., Boston, Mass., an organization which was a corner grocery in Boston in 1831 and which, by always standing for the highest and best, by staunch and sound policies, by dealing courteously in quality products, has reared a business structure of surpassing staunchness in its field.

Unlike many long-established concerns the house of S. S. Pierce is never content to go along on old-time lines. Any equipment which will better serve the patron is adopted with no count taken of the cost or inconvenience to the company. Its policy is to give the best possible

service, no matter how thorny the means to that end.

In its "corner grocery" days the company made deliveries in a wheelbarrow. It was the first organization in New England, and probably in the country, to make horse and wagon deliveries. Eight years ago it had 300 horses. Then came the truck era. Today 240 of these horses have been eliminated and in their place is New England's largest motor delivery fleet of 58 trucks—of which 50 are two-ton Autocars. The other eight trucks are either larger or smaller and fit in better than the two tonners for the particular work to which they are assigned.

Horses, of course, would not be practical for the delivery operations of this concern today. It would take thousands rather than hundreds of them to cover the field and it could only be done by running them in relays, as in stage coach days. Neither railroad freight nor express could get the goods to the consumer as surely, speedily and safely as do the trucks.

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When the first Autocar was bought in 1913 the company operated within an eight-mile radius. Now the radius is 25 miles in winter and 40 miles in summer.

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Trucks have brought the company an uncounted volume of business from vacationists during the summer months. The regular customers of the concern who go to their summer homes for 40 miles each way on the north and south shores

are now able to trade with Pierce the year around. One of the 17 little Fords in the service of the company carries a salesman along the shore, where orders are taken today and the Autocars make the deliveries next day. As many as a half dozen trucks are often in operation in making deliveries on the same stretch of coast at one time.

A number of trucks in this summer service average 500 miles a week and some of them get as much as 10 miles out of a gallon of gasoline.

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Through the staunchness of the trucks, the splendid care given them, the benefits derived from standardization and the use of pneumatic tires, S. S. Pierce Co. undoubtedly get as much, if not more, out of its motor equipment than any concern anywhere.

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The biggest asset derived from standardization is, of course, the faculty of interchanging parts. This is a mighty big asset. The time saved in the garage and service station through the ability of the mechanics to do a rush job on a truck in which every nut and bolt is an old friend counts heavily.

All the Autocar trucks are equipped all around with 36x6 cords. Pneumatics have increased the mileage of the Pierce company trucks 15 per cent., actual figures showing this result. The exact saving in gasoline and repairs is not stated, but Transportation Manager W. H. Allen declares that these economies run



Some of the 50 Autocars Which Wade Through Storms to Bring Merchandise on Time to the Patrons of the S. S. Pierce Co., Boston, Mass.

into real money. A big factor to the credit of the pneumatics is the saving in breakage of goods and the extra fine condition in which articles arrive at their destination. The ability of the pneumatic tired truck to get through the snow is also a worth while attribute.

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Excellent results have been achieved by using the new pneumatics on long haul trucks and the older ones on those operated nearer home.

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The company management was won over to pneumatics a trifle over two years ago. A number of the trucks got them at that time and the added efficiency shown caused the cords to be installed on the entire outfit last winter.

The S. S. Pierce Co. got its first truck in 1913, bought two more in 1914, six in 1915 and has since steadily pursued a policy of motorization, adding 10 within the past year. The oldest truck now in use is seven years old. This was converted into a service truck this year. It is equipped with bins on the side, which contain every known part. By letting down the tailboard it is transformed into a working machine shop. All necessary tools for repairing a truck or getting a motor vehicle back on the road are carried. Nothing is missing that would aid in this work.

The company does not depend entirely on this service truck, however. For breaks any distance away a motorcycle is used. This is a side car outfit, the extra seat containing a box of parts and tools. The motorcycle answers a call for help in record time. Typifying the speed of this S. O. S. equipment a truck broke down in Lynn a short time ago. This was 12 miles from the service station. Although the break was a bad one the truck was on its way again and the motorcycle was headed homeward 35 minutes after the phone call had reached the station.

The garage and service station maintained by the organization is the last word in practical, efficient truck surgery. The station is open 24 hours a day and seven days a week. Cars are washed, oiled and greased at night and minor repairs are also made outside of business hours. Chauffeurs are not allowed to tinker with their cars at any time.

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The garage and service station is at 25-27-29 Jersey street and is thorough to the last detail. It employs 16 people, including a superintendent, bookkeeper, day chief mechanic, night foreman and a dozen specialists. All trucks go into the station for a complete inspection after each 3000 miles of operation. Usually they are in a day, occasionally two.

That their stay may be short all spare parts are ready at all times. This includes a set up rear end, a spare engine, etc. Of the larger parts, but one spare is kept and this has been found to be enough despite the big fleet. On only one occasion since the day of motorization has this schedule gone awry. This was when there came a call for two spare engines on the same day. It never happened before and the service station officials do not look for a repeat. During the inspection process the spare parts are installed in the truck, the parts taken out being fixed up and then used as spares on the next call.

During the summer season trucks are naturally inspected oftener, those on the long daily trips to the seashore doing 3000 miles in six weeks. The service station equipment lacks nothing. Cranes are used to install the heavier parts. Every adjunct to speed and efficiency is employed that the trucks may be kept running at all times.

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Transportation Manager Allen feels that the trucks now used which have the benefit of this improved service will last indefinitely. Parts will be replaced, of course, but the main features of the

truck will be intact and the cost of buying a new machine saved. Trucks that have been working day in and day out for the company for five and six years and have gone upwards of 50,000 miles are holding their own in every respect with the latest equipment.

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The 60 horses now used by the company are run in singles, pairs and fours. They are used in hauling freight from the railroads and docks.

Probably the greatest tribute that could be paid to the efficiency of any organization operating on such a mammoth scale as the S. S. Pierce Co. is the plain statement that not a delivery out of 10,000 was missed in the big storm of last winter, the worst from the standpoint of severe weather in three decades. Trucks were responsible for this magnificent achievement.

The added fact that not a truck was laid up during the worst storm in the memory of the oldest inhabitant crowns this brilliant accomplishment.

The deadliest storm was on Feb. 10. At many points not a truck moved. Yet the S. S. Pierce Co. had its equipment on the run all the time. Transportation Chief Allen advertised for high school boys and 100 responded. These were equipped with toboggans and snow shoes. The trucks were driven through the principal arteries of travel and then the youngsters, with their toboggans and snow shoes, invaded the side streets and alleys, delivering the merchandise. On Saturday night the order slate was clean with the exception of two routes. Several trucks and their accessories were put to work on Sunday at 9 a. m. and at 2 p. m. the last delivery was made.

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No truck other than an S. S. Pierce vehicle was able to penetrate to Hingham, 20 miles from Boston, during this period. People there were actually in want for foodstuffs. Two of the Autocars made the trip and high school boys, with their toboggans and snow shoes, made the deliveries.

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The S. S. Pierce Co. takes care of its men even better than it looks after its machines, a rare trait in modern business. The chauffeurs are well paid and get extra for overtime. They are also treated with courtesy and consideration at all times and when asked to do the impossible that a patron may be served are well paid for their trouble.

Recently an experiment was tried in gasoline saving, a prize of \$5 a month being offered for the chauffeur in each of three delivery zones that effected the most economy in gas each month. The zones were those of 30 to 40 miles daily, those between 40 and 50 and those over 50. This was a good thing for the chauffeurs, but it also proved a fine investment for the company, a saving of a cent a mile on gasoline resulting.

The speed and efficiency of the motor truck in this service gives the drivers time to tender every courtesy to the customer. Deliveries are made into the kitchen, every article is checked up and



A Two-Ton Autocar Ready to Set Forth with Capacity Load in Delivery Service of S. S. Pierce Co., Boston, Mass.

signed for. This feature is a benefit to the store as well as the patron. The same care is also taken in checking up truck costs.

A card system is employed and every factor which enters into the operation of the motor carriers is noted. Figures for the week, month or year can be produced almost immediately.

There is one other efficiency point in connection with the running of these trucks which must be introduced. This is the size of loads carried. Trucks are always at capacity and, because experiments have shown the course to be safe-worthy, there is no hesitation in piling loads of $3\frac{1}{2}$ tons on any of these vehicles.

The S. S. Pierce Co. has a huge retail establishment on Tremont street and another at Copley square. Its wholesale house is on Milk street and a branch is conducted in Brookline. It is by recognizing such steps in modern progress as the utility of the motor truck that this



Snow No Obstacle to the Dependable Autocar Delivery Service of the S. S. Pierce Co., Boston, Mass.

institution has come up through the years, gathering strength in each cycle of time until today it recognizes no rival in its sphere.

TAUGHT TO STANDARDIZE.

Mr. Weicker, manager of the O K Transfer and Storage Co., Oklahoma City, is one of the owners who has learned the benefit of standardizing on a quantity truck. His first International was a model H. This sturdy little truck was on the job early and late. It hustled right along and finished every job of hauling on scheduled time.

Because of the prompt, efficient service, Mr. Weicker was able to give his customers with this truck his business grew rapidly. Soon he needed more hauling equipment and he decided to stick to Internationals because his first one had performed so well. He bought a model F and another model H. The good service has continued and business has increased until the O K Transfer fleet now numbers nine International motor trucks—four model G's, two model K's, one model F and two model H's.

Bob Crowthers has left the Gary Motor Truck Co., Gary, Ind., and is with Master Trucks, Inc., 3132 Wabash avenue, Chicago, in capacity of advertising manager and assistant sales manager.

HIGHWAY TRANSPORT CONFERENCE TO BE HELD

FEB. 23

The future of highway transport and its effect upon the economic and sociological life of the nation, as translated into terms of every day use of the highway by the farmer and the city user of the motor vehicle, will be discussed by men, nationally known in governmental, industrial and educational circles at a notable conference to be held at the University of Michigan at Ann Arbor, Feb. 23.

The conference is the second regional event held under the auspices of the Highway and Highway Transport Education Committee with the officials of the university and the Michigan State Highway Department as collaborators. The first was held at Pittsburgh and others are planned in other sections of the country.

Back of them is the expressed intent of the committee to call the attention of the public to the questions arising out of the new member of the trinity of

transportation and to stimulate research and study along these lines in every grade of every class of educational institutions from the kindergarten on through the college, as well as in community and vocational effort. With virtually 9,000,000 motor vehicles now plying the 2,500,000 miles of highways of the country, a trained personnel will be needed to administer the vast sums of money which will be set aside for highway construction and maintenance, while literally thousands of others will be required to build and operate fleets of motor vehicles which authorities forecast will shortly be supplementing railway and waterway facilities.

29,126 TRUCKS EXPORTED.

Automobiles exported from the United States in 1920 numbered 142,508 passenger cars and 29,126 commercial cars, according to a report by the Department of Commerce. The total was more than twice that in 1919 and four times that in 1918.

Shipments in large quantities were made to Europe, Asia, Central and South America, Canada and Mexico.



Fleet of International Trucks Which Grew from One in Service of O. K. Transfer & Storage Co., Oklahoma City, Okla.

TOTAL OF 961,635 TRUCKS REGISTERED

There are close to a million motor trucks in use in the United States, according to figures carefully compiled by statisticians of the B. F. Goodrich Rubber Co., Akron, O., and which are probably as close as any survey possible nowadays when a number of states do not segregate trucks and cars. The Goodrich figures report a total of 961,635 trucks registered, over 10 per cent. of the total motor vehicle registration of 9,295,252.

In 30 states the actual registration figures were secured. In 18 studied estimates were made. These latter are decidedly conservative and probably fall below the actual number, which suggests that there may be a round million of trucks in actual service today.

It will be good news to the industry to know that most of the states which have not differentiated between trucks and cars in registration figures will do so this year, so that when the totals for 1921 are compiled they will be officially correct.

According to the Goodrich figures, New York led all other states by a substantial margin with 132,524. Ohio came second with 83,300. Pennsylvania, which ranked third in the number of motor vehicles of all kinds, dropped to fourth place in the truck list, Illinois taking

third place with 64,995. Pennsylvania's trucks totaled 52,605.

The next six states in the list were: Massachusetts, fifth, 51,386; Michigan, sixth, 45,773; California, seventh, 35,857; Indiana, eighth, 32,482; Texas, ninth, 30,000, and Washington, 10th, 25,570.

It is interesting to note that 27 states, more than half the total number, had 10,000 or more trucks. Of this number the large majority were states where considerable manufacturing is done. The agricultural states, however, were well represented, and it is safe to predict that in a few years they will be in the majority.

The largest increase in truck registration during 1920 was shown by Florida, which jumped from 3239 to 10,448, a gain of more than 300 per cent. Massachusetts jumped from 42,000 to 51,386. Michigan from 36,863 to 45,773, and Wisconsin from 10,887 to 16,205.

State	Rank	Trucks
Alabama	24	12,696
Arizona	35	7,200
Arkansas	43	3,500*
California	7	35,857
Colorado	33	7,728
Connecticut	13	23,937
Delaware	44	3,500*
Florida	27	10,448
Georgia	25	12,000
Idaho	42	4,000*
Illinois	3	64,995

Indiana	8	32,482
Iowa	14	23,700
Kansas	16	17,000*
Kentucky	23	13,260
Louisiana	36	7,000*
Maine	334	7,600
Maryland	18	16,500*
Massachusetts	5	51,386
Michigan	6	45,773
Minnesota	20	16,000*
Mississippi	38	6,300*
Missouri	11	25,000*
Montana	47	1,500*
Nebraska	15	19,000*
Nevada	49	460*
New Hampshire	41	4,431
New Jersey	12	23,500
New Mexico	39	6,000*
New York	1	132,524†
North Carolina	22	13,455
North Dakota	46	1,455
Ohio	2	83,300
Oklahoma	29	9,218
Oregon	17	16,860*
Pennsylvania	4	52,605
Rhode Island	28	9,768
South Carolina	31	8,500*
South Dakota	30	9,000
Tennessee	26	11,638
Texas	9	30,000*
Utah	40	5,543
Vermont	45	2,915
Virginia	21	14,000
Washington	10	25,570
West Virginia	32	5,000*
Wisconsin	19	16,205
Wyoming	48	1,200*
District of Columbia	37	6,826

Total.....961,635
*Estimates made by state motor vehicle registrars.
†Omnibuses added.

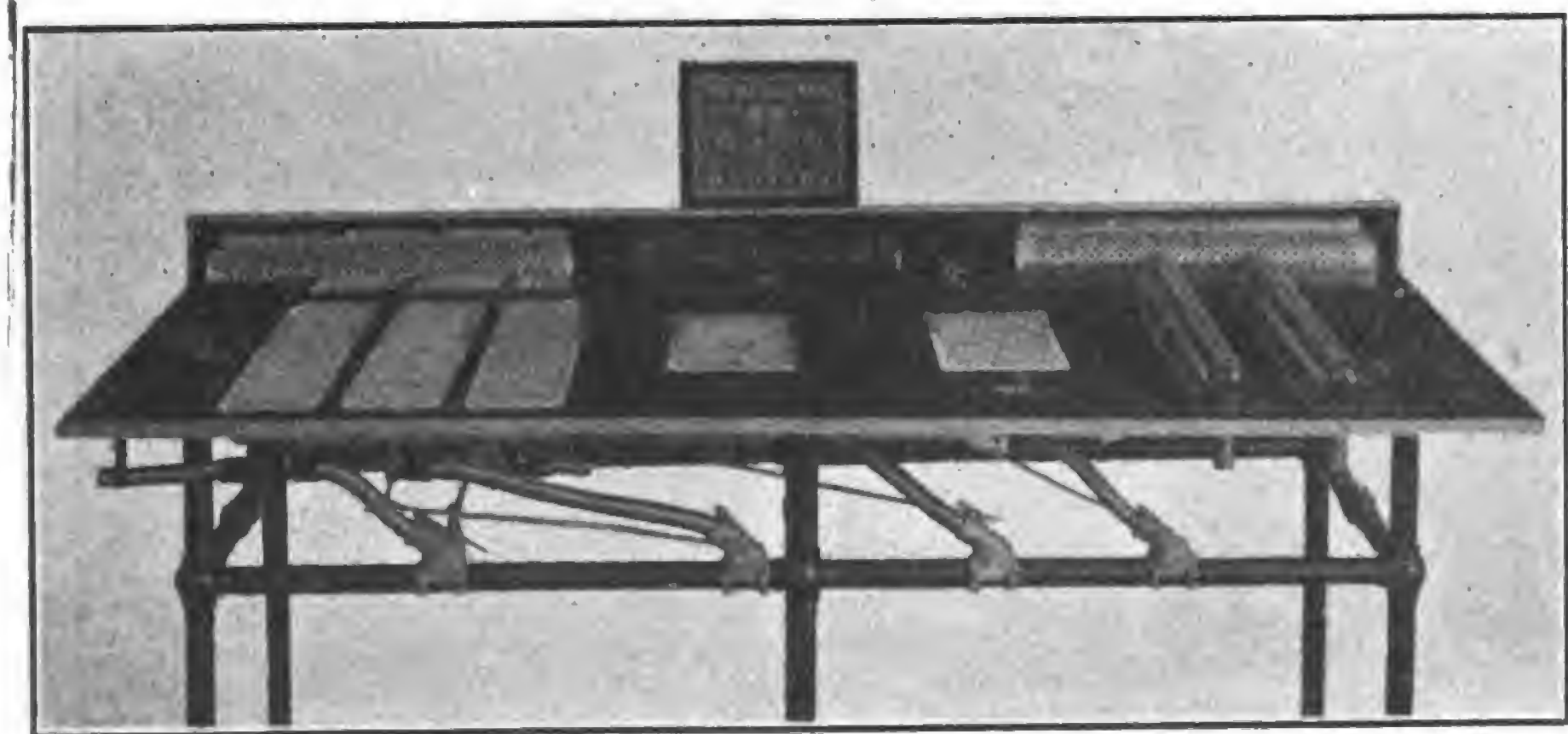
HEATERS IN VARIETY ON
DISPLAY AT THE
AUTO SHOWS

The numerous types of motor car heaters to be seen at the automobile shows prove the fact that it is not reasonable to suppose that any one type of heater is suitable to all makes, sizes and prices of cars. There were not less than nine varieties of one heater alone, the Perfection, visible on 50 out of the 88 makes of passenger cars on exhibit at the New York show and the same conditions prevailed at Chicago.

"It is just as unreasonable—and as unnecessary, too"—says C. S. Pelton, vice

president of the Perfection Heater and Manufacturing Co. of Cleveland, "to ask any one kind of heater, or one particular size of valve, to adapt itself to all makes of cars, as it is to make the same request of any one size of carburetor or muffler. The latter idea would not appeal for a moment to any owner of a machine who cared a cent about the welfare of so valuable a friend; neither does the first—now.

"Structural and other features need not be disregarded. At least one type of Perfection heater will be suitable for installation on any passenger car or truck on which it is possible to use a heater. Perfection heaters have already been adopted as standard equipment on 47 motor trucks."



Display of Perfection Heaters Which "Sold" Their Utility at the New York and Chicago Shows.

BROWN CLYDESDALE HEAD.

Frank D. Brown, a director and chairman of the finance committee of the Provident Bank & Trust Co. of Cincinnati, has been elected president of the Clydesdale Motor Truck Co., Clyde, O., succeeding C. R. Dunbar. Other officers elected are: Vice presidents, C. Dunbar and A. C. Burch; treasurer, W. P. Dodge; assistant treasurer, J. C. L. Krebs, who has been a vice president; secretary, Homer Metzgar; directors, officers and J. H. Baynes and Charles H. Bowker of Northampton, Mass.

BOOK ON TRUCK BODIES.

The Blue Book of Motor Truck Body Types, an 80-page reference book issued by the International Motor Co., which also gives the first complete history of the Mack organization, is just off the press, and should be of valuable aid to those in the field.

FEDERAL HIGHWAY BOARD.

That the highway question is so important that it should be made a separate function of the government rather than left in charge of a bureau of a department, is the opinion expressed by Edward S. Jordan of the Highways Committee of the National Automobile Chamber of Commerce. Mr. Jordan has forceful arguments to show the benefits the nation would derive from such a forward step.

WISCONSIN ENGINES OPERATE AT PAR WITH POOR FUEL

THE Wisconsin Motor Manufacturing Co., Milwaukee, Wis., has specialized on engines almost exclusively and it is now one of the largest concerns in the industry. Its products have been developed for diversified service, but at present efforts are being concentrated on nine models, eight four-cylinder and one six-cylinder, all four-cycle, L-head types.

The engines are built as follows:

Model CAU having a 3¼-inch bore and five-inch stroke; S. A. E. rating, 22.5 horsepower.

EAU with four-inch bore and five-inch stroke; S. A. E. rating, 25.6 horsepower.

TAU with four-inch bore and six-inch stroke; S. A. E. rating, 25.6 horsepower.

UAU with 4¼-inch bore and six-inch stroke; S. A. E. rating, 28.9 horsepower.

VAU with 4½-inch bore and six-inch stroke; S. A. E. rating, 32.4 horsepower.

RAU with 4¾-inch bore and six-inch stroke; S. A. E. rating, 36.1 horsepower.

RBV with five-inch bore and six-inch stroke; S. A. E. rating, 40 horsepower.

M with 5¾-inch bore and seven-inch stroke; A. L. A. M. rating, 53 horsepower.

P a six-cylinder model with 5¾-inch bore and seven-inch stroke; A. L. A. M. rating, 79.5 horsepower.

The first eight models are used in heavy duty truck and tractor service, the latter engine, model P, being used almost exclusively for motor boat and yacht power purposes.

While the engines do not differ with reference to basic principles of design, in materials or workmanship, they do differ in regard to dimensions and proportion of parts, as well as construction details. Some of the smaller four-cylinder types have the cylinders cast en bloc, while the larger types and the six-cylinder engines have the cylinders cast in pairs.

To Run with Poor Fuel.

Wisconsin engines have been developed to meet the requirements of the most advanced practise for truck and tractor service, and are designed to burn the lower grades of fuel, which are often the only product obtainable, and which do not afford satisfactory economy or power in types designed for better grades of fuel.

The engine cylinder units are cast from highest grade gray iron with the water jacket integral, the water channels being very large. The heads are cast from the same material and the valve and spark plug bores are surrounded with large water spaces. The pistons are of the same material. Much care is taken in machining the cylinders, heads and pistons to obtain accuracy and they are frequently inspected and tested for defects.

Aluminum Crankcases.

The crankcases are aluminum castings, these being in two parts, the upper sections having extremely heavy webs

to carry the three main bearings. The lower sections are the crankcase bases and the oil reservoirs. There are front extensions that house the timing gearsets and rear extensions that form the bell housings.

The crankshafts are drop forged from chrome nickel steel, heat treated and ground to size, with a tensile strength of 120,000 pounds a square inch. The crankpins are 2¼ inches diameter and the journals from front to rear being 2¼, 2 5/16 and 2¾ inches in diameter, respectively. The camshafts are a three-bearing type, drop forged, with the cams integral, heat treated, case hardened, carefully ground and balanced. The bearings are large, so the cams may be passed through them.

Flanges for mounting the timing gears at the forward ends are forged integral with the shafts. End play of the camshaft is obviated by the use of spring mounted plungers seated in the covers of the timing gearset cases.

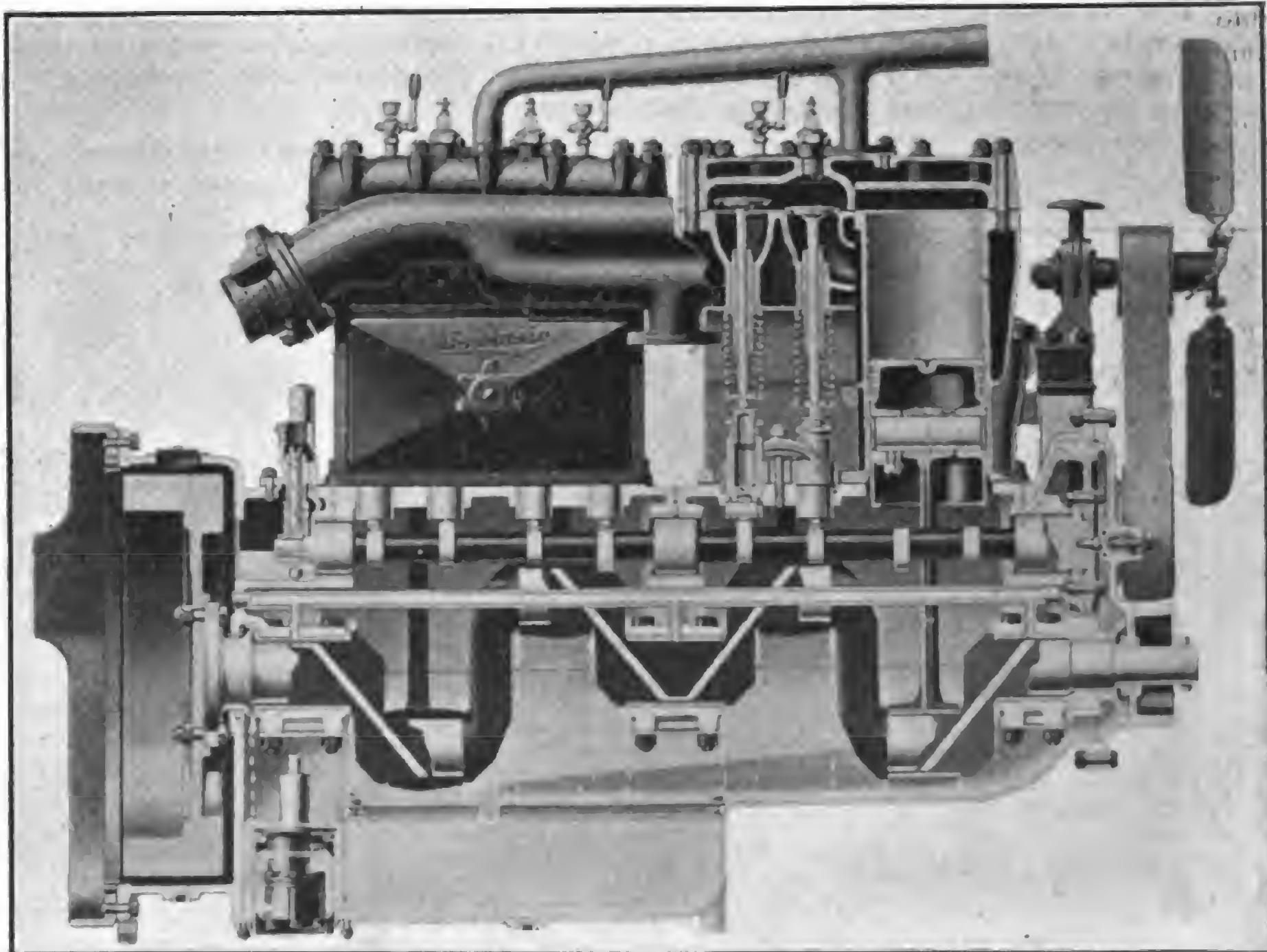
The timing gears are large and have wide faces. The camshaft gear is cast iron but the other gears of the set are drop forgings, heat treated, that are helically cut. The connecting rods are of 35 per cent. carbon steel drop forged I sections. The valves are of large size and have ample clearance, the inlets being chrome nickel steel and the exhausts being tungsten steel. The valve tappets are a roller type of unusually large diameter and the tappets, rollers and the roller pins are hardened, so that maximum endurance will be afforded. The tappets operate in cast iron guides, that are secured by crabs and studs. The

valve mechanism is enclosed by cover plates that are easily removable and there are breather holes in the base of the chamber through which oil mist is admitted to lubricate the tappets and valves. The bearings of the crankshaft, camshaft, pump shaft and the idler gear of the timing gearset are high grade babbit in bronze cages, and the crankshaft and crankpin bearings are fitted with one-piece laminated shims.

Pressure Lubricating System.

The oiling system is claimed to be very efficient. It is a pressure type, there being an oil header, so-called, cast in the crankcase with ducts to the main bearings of the crankshaft. In the crankshaft are drilled ducts to the crankpins and the connecting rods are fitted with tube extending from the crankpin bearing to the wristpins. The oil pump is bolted to the upper section of the crankcase and the intake extends down into the oil reservoir and into a screened well, the screen of which is removable without dismantling the oil pump or taking off the lower section of the crankcase. There is a relief valve that is set for a maximum pressure, and when this is exceeded the oil is bypassed back into the reservoir so that there can never be pressure above what is necessary to obtain practical and efficient lubrication. There is a large combination breather and oil filter fitted at the forward end of the crankcase on the same side as the oil pump.

The fuel intake and the exhaust manifold are cast as a unit and are so designed that the mixture exhausted preheats the incoming mixture from the



Sectional View of Wisconsin Heavy Duty Engine, Showing Pressure Oiling System and Other Structural Details.

carburetor, making it vaporize readily and be properly combustible when it reaches the cylinders. The diameters of the intake manifold are so proportioned that economical carburetion will obtain. The engine is equipped with a large fan that is driven by a two-inch flat belt from a pulley on the extension of the water pump shaft.

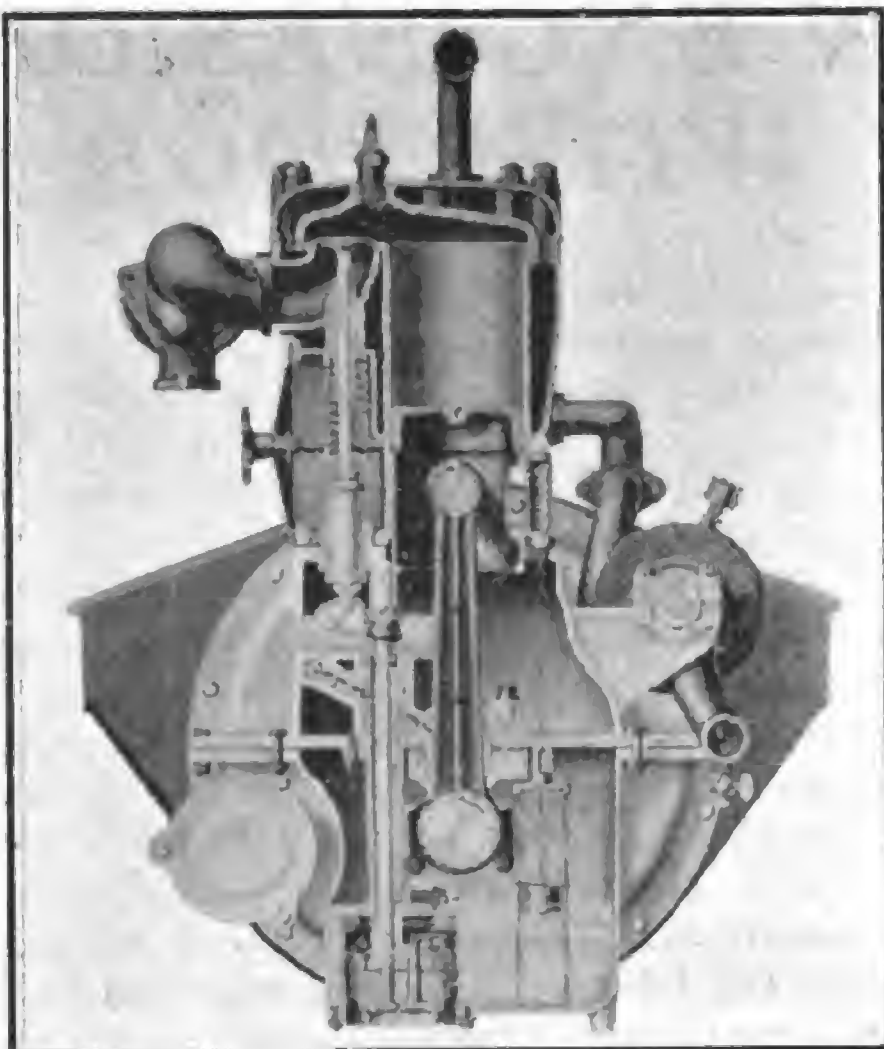
Standard Units May Be Used.

The design of the crankcase is such that electric generators and starting motors having the standard S. A. E. flanges may be mounted on them. These units, as well as the carburetor and the magneto, are so located that the engine is extremely accessible for inspection or repair, and the mounting of a steering gear at either the right or left side of the engine is entirely practical. Means are provided for driving any of the commercial governors when these are desired and manifolds can be provided that are adapted for use with the different instruments.

One of the features of the engine is the "three-point all-steel suspension," which is in effect a large diameter trunnion on the iron cover of the timing gearset case, that seats in a frame cross member and a cast steel or malleable iron support arm that is bolted to the crankcase bell housing, this being a heavy metal ring on which are arms, such as are cast integral with crankcases of many makes of engines. With this connection, it is claimed, the wear of the supporting arm holes is practically obviated. In the event of breakage of the steel support, which is very remote, the member may be easily replaced at comparatively small expense.

Smaller Type Engines.

The cylinders of the smaller type engines, CAU, EAU, TAU, UAU and VAU, are all en bloc construction, with L head type cast cylinders, fitted with detachable heads. Aside from having mushroom tappets these are constructed the same as the RAU and RBU engines, the dimensions being in ratio to the stated differences. The CAU and EAU engines



Sectional Front View Wisconsin Heavy Duty Engine, Showing Massive Construction of Units and Details of Pressure Lubricating System.

have cylinder bores of $3\frac{3}{4}$ and four inches, respectively, and stroke of five inches. These also conform in a general way to the construction of the larger engines, the principle difference being that the cylinder blocks are cast with the heads and water jackets integral, and the valves of mushroom type. No relief valve is fitted to the lubricating systems of these engines, as the pumps are smaller and pressure relief is not regarded as necessary.

The type M and P engines are respectively four and six cylinders and are built heavier than types RAU and RBU. The diameter of crankshaft at bearings is $2\frac{3}{8}$ inches, and the length of the main bearings from front and center is four inches, while the rear bearing is six inches. The length of the connecting rod bearings is $3\frac{1}{4}$ inches, diameter of wrist pin $1\frac{7}{16}$ inches, diameter of camshaft $1\frac{1}{2}$ inches, number of piston rings four and the diameter of the valves $2\frac{1}{2}$ inches.

It will be seen from these dimensions that M and P engines are designed for

unusually heavy duty truck, tractor or marine work. Lubrication is of the pressure type, the geared pump being located on the outside of the crankcase and driven by spiral gears from the camshaft.

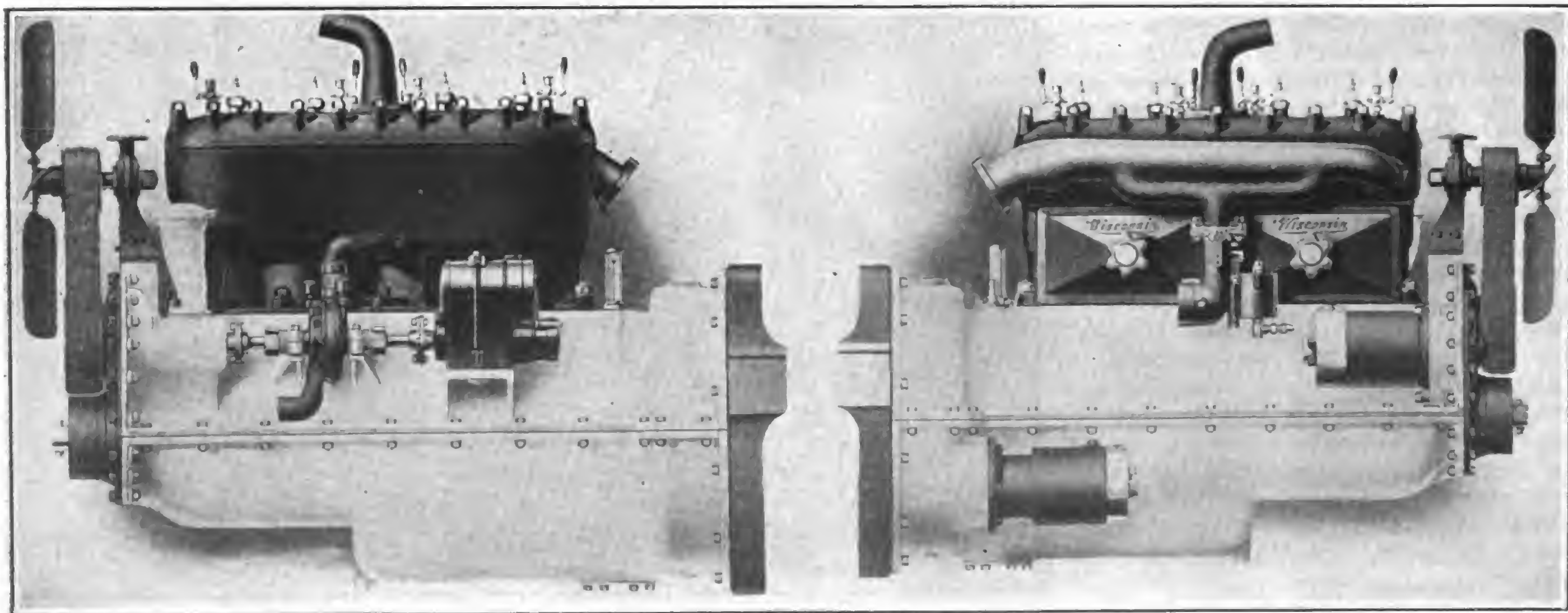
An oil gauge, located at the exhaust side of the engine, indicates the quantity of oil in the reservoir, high and low marks being located on the gauge, and claim is made that if the oil supply is maintained between these points that smoking of the engine will be obviated.

DIAMOND T INJUNCTION.

A perpetual injunction has been granted in Federal court at St. Louis by Judge Faris to the Diamond T Motor Car Co. of Chicago, restraining Harry Newman, Inc., of St. Louis, from advertising or offering for sale Diamond T trucks at less than their listed price. In the petition for an injunction, it was alleged that the defendants were former distributors of the truck in St. Louis, but that their contract was cancelled for good reason and that they were advertising in 25 of the larger cities of the country that they would sell Diamond T trucks at a 35 per cent. discount without any intention of making bonafide sales, but with the malicious purpose of injuring the motor car company and for the further purpose of forcing the settlement of a law suit then pending.

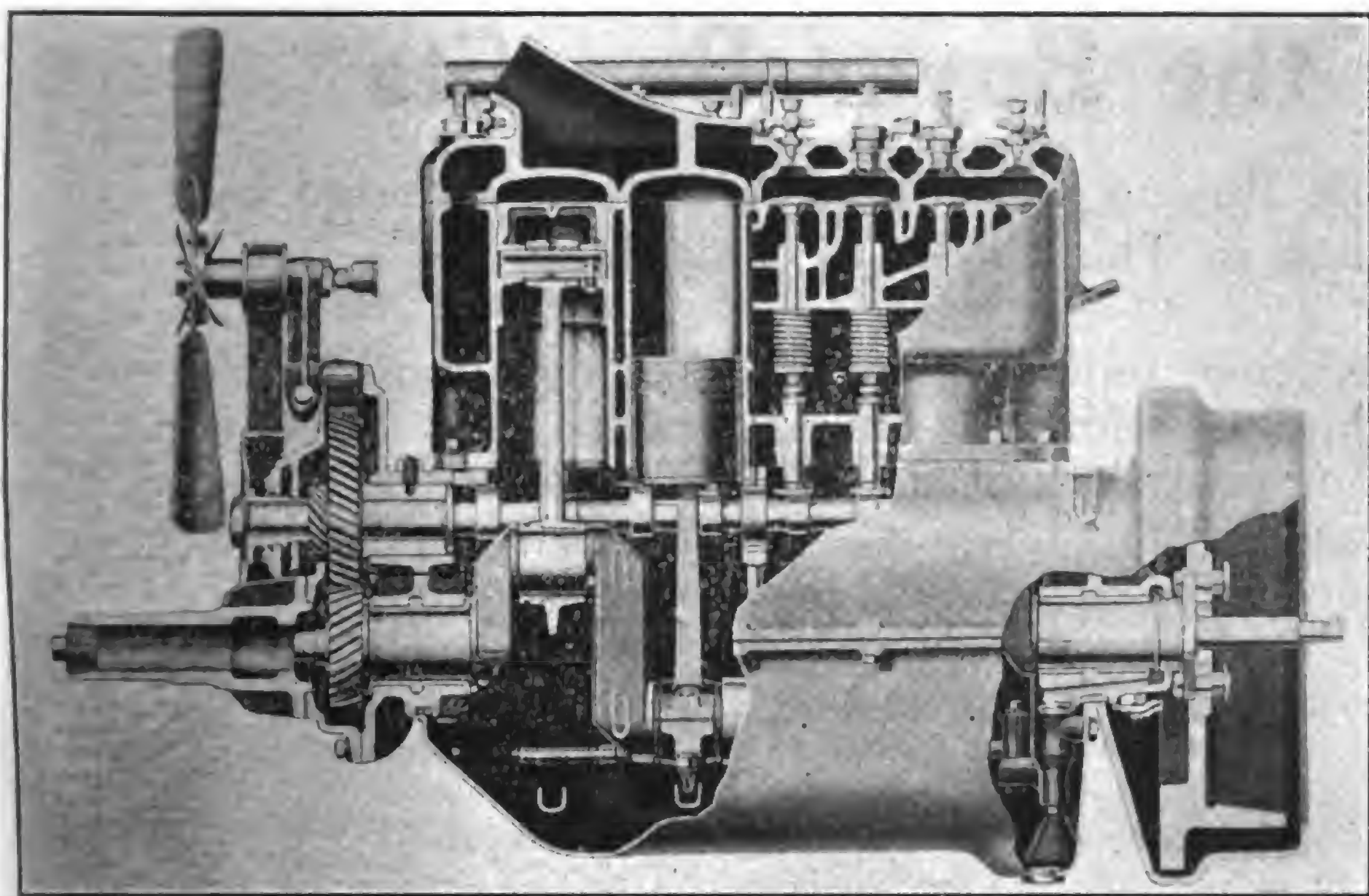
Judge Faris appointed a special master to establish damages and in granting the injunction declared he never had seen a case "that equals the malice involved in this."

Business is rapidly being restored to normal at Lansing, Mich. All units of the Motor Wheel Corporation are in operation, the Auto Wheel unit having been started Monday morning, as was also the Gier Pressed Steel plant. The Pruden Wheel unit was started some time ago, and the southern unit in Tennessee, which produces raw material for the Lansing plants, has been going at full blast for several weeks.



Right and Left Views Wisconsin Liberty Model Engine, Designed for Heavy Duty Truck and Tractor Propulsion, Showing "Three-Point All-Steel Rear Suspension."

NEW PREMOCAR 1½-TON SPEED TRUCK



Sectional View of Lycoming Engine in New Premocar Speed Truck.

The Preston Motors Corporation, Birmingham, Ala., announces the starting of production on the new Premocar 1½-ton speed truck, which has been developed after a period covering several months, during which time the truck has been given many test runs over long, difficult routes in which the unit has proved its stamina and durability over the unusual road conditions found in the South.

Well known construction units are used throughout and these are claimed to have been selected by the engineers of the company after a period of severe testing at the factory.

The new truck is an assembled product, in which every unit has been in use in other makes and shown exceptional power for the class of work for which the Premocar truck has been developed.

The truck is designed for fast delivery purposes in a class where overloading is the rule rather than the exception and where speed is not so important as is the case with lighter well named speed wagons which are capable of handling up to 1½ ton loads at a speed of 30 to 35 miles per hour.

Ample Power for All Purposes.

The engine used in the new 1½-ton truck is a Lycoming four-cylinder, four-cycle, L-head type, with the cylinders cast en bloc, fitted to a two-piece crank case and separable head. The crankshaft, a three journal type, is a drop forging of double heat treated carbon steel, with all bearing surfaces accurately ground to size and perfectly balanced, and flange at rear end are cast integral to which flywheel is later bolted. The camshaft and cams are forged integral, fitted with integral flange at the forward end to which the camshaft gear is bolted.

Pistons are fitted with three rings at the top and oil groove at the bottom, while the connecting rods are drop

forgings made of carbon steel, heat treated. The lower end of the rods are split and fitted with adjustable die cast babbitt bearings, backed by bronze shells. The upper ends are fitted with phosphor bronze bushing, working on a wristpin of steel tubing, and fastened by a steel stud of two diameters screwed into the piston boss and the wrist pin.

The timing gears are five in number, contained in an extension of the upper and lower halves of the crankcase, are cut helical and are very quiet in operation, covered by a removable plate at the front and lubricated by positive bath of oil in the sump under the gears.

Circulating Splash System.

Lubrication of the engine is by means of an oil pump located in the oil reser-

voir at the rear of crankcase and pumping the oil to a series of troughs located under each connecting rod scoop. This method is called the circulating splash system and is claimed to be very positive in action and circulates the oil according to the speed of the engine. The excess oil overflows back into the reservoir to be used again. The main bearings of the crankshaft and camshaft are supported by webs, which are cast integral with the upper section of the crankcase and the oil pump is fastened to the rear main bearing web.

The crankcase is constructed of cast iron and is designed to give maximum strength and rigidity, with minimum weight. For unit construction the upper half of the bell housing is cast integral with the case. The oil pan is separate and can be removed easily for cleaning, tightening bearings, etc., as occasion requires. A drain out plug is fitted in the lower pan below the pump, which allows for draining the oil.

The bore of the cylinders is 3½ inches by five-inch stroke and develops under the S. A. E. rating at 2000 revolutions a minute 19.6/35 horsepower.

The cooling system is thermo syphon, consisting of a fan mounted on a bracket on the timing gearset cover, driven by wide belt and large cellular type radiator fitted with cast pans, providing ample cooling area for all conditions.

Power is delivered to the transmission gearset through a Borg & Beck single plate dry disc clutch, smooth in action and simple of adjustment. The transmission gearset adjoins the clutch and is a unit with the engine and clutch. A tubular steel propeller shaft connects the transmission with the worm drive in the rear axle, the worm being nickel steel, while the worm wheel is made of bronze.

(Continued on Page 98.)



The Premocar 1½-Ton Speed Truck Which Has Answered Every Demand Made Upon It in Trying Test Runs.

Where the Buyer Benefits

How More Favorable Buying Conditions Are Being Created by Advertising in This Paper at This Time

Through regular advertising, sellers are making buying opportunities, instantly available. By publicly committing themselves in their advertising, they are giving you a strong assurance of faithful performance.

Advertisers are cutting sales costs through the use of advertising as a SALES MACHINE just as they reduce production costs by improved machinery methods.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Forum
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries

Bakers' Weekly
Boiler Maker
Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy

Canadian Grocer
Canadian Railway and Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothing and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton

Daily Metal Trade
Distribution & Warehousing
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Mining Journal
Engineering News-Record
Engineering & Contracting

Factory
Farm Implement News
Farm Machinery—Farm Power
Fire & Water Engineering
Foundry (The)
Furniture Journal
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal

Gas Age
Glass Record
Grand Rapids Furniture Record

Haberdasher
Hardware Age
Heating and Ventilating Magazine
Hide and Leather
Hospital Management

This means ability to make LOWER PRICES to you.

Advertising in a buyer's own paper caters to his convenience; it saves the buyer's time; it helps the buyer weigh and balance rival claims; when the salesman calls, it saves the time of both buyer and salesman by providing the foundation for intelligent judgment.

None but good concerns are admitted to the advertising pages of members of The Associated Business Papers, Inc.

The seller who is building reputation through advertising will jealously guard that reputation in every transaction, beginning with the merit of the merchandise.

Advertising indicates progressiveness, not alone in selling, but throughout the entire business.

By advertising, the seller is publicly displaying his ability and desire to serve you, instead of silently relying upon the necessity of the buyer to produce orders.

You are invited to consult us freely about Business Papers or Business Paper Advertising

LIST OF MEMBERS

(Continued)

Hotel Monthly

Illustrated Milliner
Implement and Tractor Age
Implement & Tractor Trade Journal
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review

Lumber
Lumber Trade Journal
Lumber World Review

Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Metal Worker, Plumber and Steam Fitter
Millinery Trade Review
Mill Supplies
Mining and Scientific Press
Modern Hospital
Motor Age
Motorcycle and Bicycle Illustrated
MOTOR TRUCK
Motor World

National Builder
National Druggist
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin
Northwestern Druggist
Nugent's, The Garment Weekly

Oil News
Oil Trade Journal

Plumber & Steam Fitter
Power
Power Boating
Power Farming Dealer
Power Plant Engineering
Price Current—Grain Reporter
Printers' Ink

Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rubber Age & Tire News

Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware and Implement Journal
Sporting Goods Dealer
Starchroom Laundry Journal

Tea and Coffee Trade Journal
Textile World Journal
Welding Engineer
Woodworker

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS; 220 West 42nd Street NEW YORK CITY

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

ADVERTISING

By DR. FRANK CRANE

(Copyright by Frank Crane)

ADVERTISING is the greatest business in the world. That is not because it enables business people to sell more goods, not because it is a way to make great profits. Nothing can be really great for any purely dollars-and-cents reason.

It is because, in advertising, business becomes vocal. When, in the course of evolution, the animal acquired speech and became able to utter himself, he had made the longest stride in development. He had stepped from brute to man.

The human soul dates back to the first word. "In the beginning was the Word."

Advertisement is the utterance of human energy. Craftsmanship is good, and industry, and organization, and business ability; but they are dumb giants until they find speech—dumb and dangerous.

Business, including manufacturing, farming, transportation, and selling, is to the new world what fighting was to the old. The old world organized only to kill, and its genius was displayed by great generals. Its heroes were the mighty killers. To them it set up its statues.

The new world, typified by, led by America, is organized to serve, to make

human life richer, deeper, stronger, more complex and heterogeneous.

And business is simply service. Business comes to itself, attains maturity and full self-expression only through advertising.

Advertising is the breath of life breathed into the nostrils of business, by which it becomes a living soul.

Thus advertising not only enlarges business; it radically changes the nature of business.

By it business passes from bureaucracy and autocracy into democracy. It takes the whole people into its growth. It enters the veins of the commonwealth. It becomes a function of communal life.

Without advertising comes decay and death.

Nations need advertising. If they would advertise they would prevent war. War is the self-expression of dumb brute force. *Advertising is the self-expression of intelligent strength that knows how to speak.*

It is the something plus in advertising that is significant. It is this something plus that makes advertising to business what art is to handiwork, what music is to feeling, what language is to the soul.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service

Advertising and Selling	Electrical World	Motor Age
American Architect	Embalmers' Monthly	Motorcycle and Bicycle Illustrated
American Blacksmith	Engineering and Contracting	Motor Truck
American Exporter	Engineering and Mining Journal	Motor World
American Funeral Director	Engineering News-Record	National Builder
American Hatter	Factory	National Druggist
American Machinist	Farm Implement News	National Petroleum News
American Paint Journal	Farm Machinery—Farm Power	Nautical Gazette
American Paint and Oil Dealer	Fire and Water Engineering	Northwest Commercial Bulletin
American Printer	Foundry (The)	Northwestern Druggist
American School Board Journal	Furniture Journal	Nugent's, The Garment Weekly
Architectural Record	Furniture Manufacturer and Artisan	Oil News
Automobile Dealer and Repairer	Furniture Merchants' Trade Journal	Oil Trade Journal
Automobile Journal	Gas Age	Plumber and Steam Fitter
Automotive Industries	Gas Record	Power
Bakers Weekly	Grand Rapids Furniture Record	Power Boating
Boiler Maker	Haberdasher	Power Farming Dealer
Boot and Shoe Recorder	Hardware Age	Power Plant Engineering
Brick and Clay Record	Heating and Ventilating Magazine	Price Current—Grain Reporter
Buildings and Building Management	Hide and Leather	Printers' Ink
Building Supply News	Hospital Management	Railway Age
Bulletin of Pharmacy	Hotel Monthly	Railway Electrical Engineer
Canadian Grocer	Illustrated Milliner	Railway Maintenance Engineer
Canadian Railway & Marine World	Implement and Tractor Age	Railway Mechanical Engineer
Candy and Ice Cream	Implement & Tractor Trade Journal	Railway Signal Engineer
Chemical & Metallurgical Engineering	Industrial Arts Magazine	Retail Lumberman
Clothier and Furnisher	Inland Printer	Rubber Age and Tire News
Coal Age	Iron Age	Shoe Findings
Coal Trade Journal	Iron Trade Review	Shoe and Leather Reporter
Concrete	Lumber	Shoe Retailer
Cotton	Lumber Trade Journal	Southern Engineer
Daily Metal Trade	Lumber World Review	Southern Hardware & Implement Journal
Distribution and Warehousing	Manufacturers' Record	Sporting Goods Dealer
Domestic Engineering	Manufacturing Jeweler	Starchroom Laundry Journal
Dry Goods Economist	Marine Engineering	Tea and Coffee Trade Journal
Drygoodsman	Marine Review	Textile World Journal
Dry Goods Reporter	Mill Supplies	Welding Engineer
Electric Railway Journal	Millinery Trade Review	Woodworker
Electrical Merchandising	Mining and Scientific Press	
Electrical Record	Modern Hospital	

THE ASSOCIATED BUSINESS PAPERS, INCORPORATED
HEADQUARTERS - - 220 WEST 42nd STREET - - NEW YORK

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

(Continued from Page 95.)

A Brown-Lipe differential is used, while the axle bearings consist of large annular ball bearings.

The wheels are of wood, heavy artillery type, fitted with 12 spokes front and 14 spokes rear, equipped with demountable rims and oversize Giant pneumatic cord tires, 36 by 6 front and rear. The brakes are 14 inches in diameter, both service and emergency brakes expanding in the enclosed drums on the rear wheel hubs.

The wheelbase of the new truck is 130 inches and the tread 56 inches. The springs are semi-elliptic front and rear, of ample size and number of leaves to withstand heavy loads and to carry the truck safely over rough or uneven roads.

The new Premocar 1½-ton truck comes completely equipped with Dyneto starting and lighting system, Willard battery and Delco ignition.

The truck may be purchased either with or without a body and cab or may be ordered complete as the purchaser desires. The price of the truck, including cab, without body, is \$2350, or with body and cab, \$2470 f. o. b. factory.

The Boston Show Number of MOTOR TRUCK

Out March 8.

Will Put the Industry's Best
Foot Forward in the Field
Where It Fits Best.

New England's Population—
Over 7,500,000.

New England Truck Registration—
Over 100,000.

OIL AND KEROSENE DOWN.

The Standard Oil Co. of New York on Feb. 14 reduced the price of gasoline two cents a gallon, making the wholesale price 28 cents. This is a drop of three cents from the high mark of 31 cents reached in 1920. Kerosene was also reduced one cent a gallon, making the wholesale price 17 cents.

PACKARD PLANT SPEEDS UP.

Coincident with announcement of the regular quarterly dividend to preferred stockholders, the Packard Motor Car Co. announced on Feb. 10th re-employment of 1000 additional men, effective immediately. The company has been operating with a force of about 3000 men for several weeks.

TRUCKS AT DETROIT SHOW.

The Detroit Automobile Dealers' Association will stage its annual show for seven days beginning March 19 in the new Morgan and Wright building on East Jefferson avenue. Seventy types of cars will be on exhibition in the passenger car department and between 40 and 50 types of commercial cars.

TRIANGLE GETS HILLER.

Glen D. Hiller, formerly sales manager of the Nelson Motor Truck Co., has been appointed assistant general manager in charge of sales of the Triangle Motor Truck Co., St. Johns, Mich.

KEYSTONE-HINDLEY WORM DRIVE AXLE

An axle which has received favorable comment from the trade at large is the Keystone-Hindley worm drive axle, manufactured by the Keystone-Hindley Gear Co., 20th street and Indiana avenue, Philadelphia, Pa.

Two types of worm drives are made by this company for commercial vehicles, consisting of standard straight cut worm and worm gear ring fitted to a steel hub and the Hindley worm gear, which is somewhat shorter in the worm, having the teeth cut nearer straight.

These gears are manufactured in sizes suitable for trucks having a capacity of one, two, three and five tons.

A complete axle is also manufactured by the company, which is manufactured in sizes suitable for the following capacity trucks: One, 2½, 3½ and five tons.



Rugged One-Piece Construction of Worm Drive Housing Keystone-Hindley Axle.

These axles are equipped with one set of internal expanding brakes, which are enclosed in the wheel drum, and one set of external brakes contracting on the outside of steel wheel drum. The worm and worm wheels are mounted on annular ball bearings, and the thrust is taken up with a special two-way bearing of their own design. The differential gears

and spider are constructed of chrome nickel steel, oil tempered. The worm of 85 point carbon crucible steel, oil tempered and hardened. The driving shafts of high chrome nickel steel, special analysis and considered much higher than what is demanded by the S. A. E.

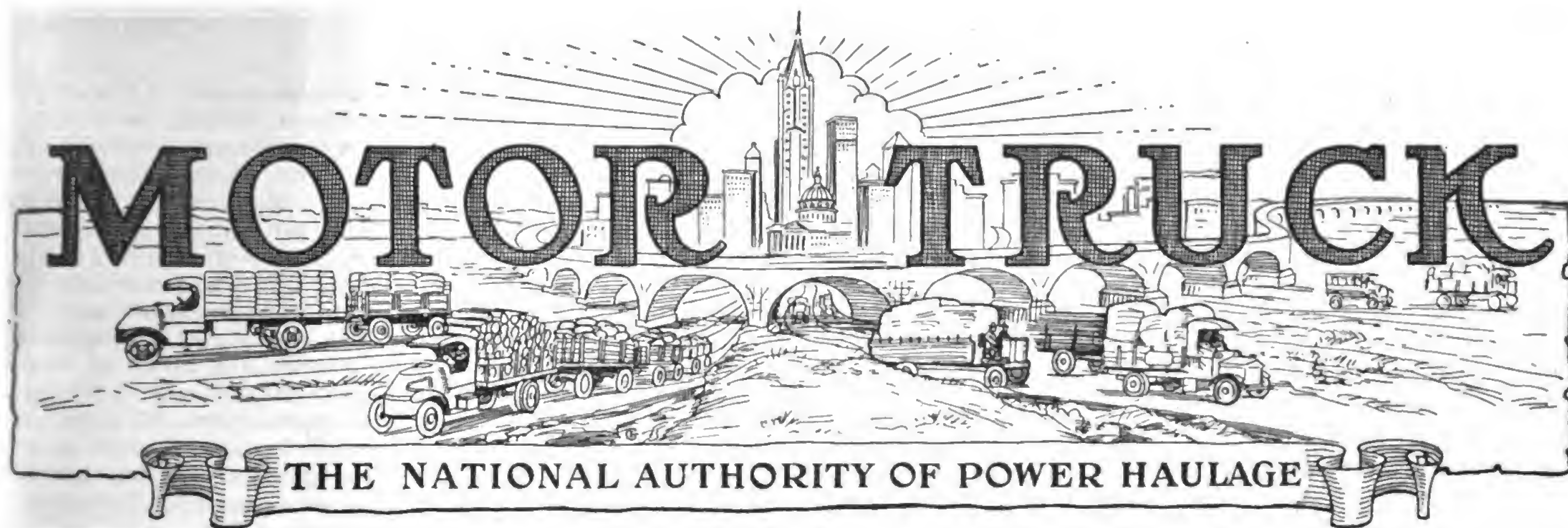
The axles are full floating type fitted with taper roller bearings in the wheels. The diameter of the axle shafts, one ton size, 1¾ inches; 2½ ton capacity truck, 1 15/16 inches; 3½ ton capacity truck, 2 1/16 inches, and the five ton, 2 5/16 inches.

These axles are furnished with floating spring seats, distance and torque rods, brackets and also provided with fixed spring seats to drive through the springs.



High Grade Materials Used in Worm and Worm Gear.

W. F. Taylor of New York has been named director of eastern sales for Aca-son Motor Truck Co., and will have jurisdiction in all eastern territory. This will include the section east of Pittsburgh and extending from the New England states to Virginia. Taylor formerly was Federal truck distributor at Philadelphia, but has recently been associated with his brother in New York handling Signal trucks.



VOL. XII. NO. 3.

PAWTUCKET, R. I.

MARCH, 1921.

GETTING 100 P. C. SERVICE FROM FLEET OF 159 TRUCKS

REMARKABLE PAPER READ BEFORE CHICAGO S. A. E. MEETING
GIVES FINDINGS BASED ON HANDLING THIS HUGE EQUIPMENT
DAY AFTER DAY—PRACTICAL CARE AND MAINTENANCE OF POWER
VEHICLE OUTLINED—CONSTRUCTIVE HINTS FOR IMPROVING PARTS

(By NORMAN J. SMITH, Superintendent of Garages, Consumers Co., Chicago, Ill.)

THE object of this paper is to point out some of the difficulties which present themselves in motor truck maintenance, and to suggest, if possible, the lines along which improvement seems most needed, in order that these difficulties may be reduced to a practical minimum.

Sometimes the buyer and user of a motor truck experiences disappointments due to a lack of cooperation between the engineering department and sales department of the truck company. The term "service" is often misunderstood by the purchaser of the truck and misrepresented by the salesman. With the exception of a few minor adjustments service is sold and not given, but the buyer sometimes understands from the salesman that he is to receive free service, and so a misunderstanding arises.

Again, salesmen sometimes make claims and promises which are unauthorized by the factory or the engineering department, and upon which they are not prepared to make good. A dissatisfied customer is likely to be the result, because he feels that things have been misrepresented to him.

All such trouble could be avoided by a better working agreement between factory and sales force. Salesmen should have accurate information on the service policy of their company, and on all guarantees which they are authorized to make. Furthermore, when the prospective buyer asks questions in regard to the engineering or mechanical details,

the salesman, if unequipped with accurate information, should not draw upon his imagination, as is sometimes the case, but should get the desired information from the proper source. In this way complete understanding between seller and buyer would exist from the start, and the latter would know exactly what the truck was supposed to do when he placed it in service.

It seems to me that this question of cooperation between engineers and sales department is an extremely important point in the psychology of selling and buying a motor truck. The buyer must understand exactly what he is buying, what it will do and the circumstances under which it will operate properly. The salesman is the man from whom he must get most of this information.

Where the Salesman Slips.

The engineer is particularly interested in turning out a truck that will run a long time in a satisfactory manner. No matter how well his truck may be built it will not stand abuse. Consequently, he is vitally interested in having the salesman educate the customer, and in making sure that the salesman, in his eagerness to make a sale, is not losing sight of the necessity of the truck finding a good home.

The country is full of trucks running at excessive speed in spite of a 100 per cent. overload; perhaps doing work that could be performed more economically in some other way. They are left in the garage over night and take up their

work again next day without having received the proper attention to make them fit for the street. It is a hopeless task for the poor truck and extremely difficult for the best. The result is very likely to be an early journey to the junk heap and a dissatisfied customer, and the cause, all too often is the salesman.

While a motor truck is in the repair shop it is a source of double expense; indirect expense due to overhead, because it is idle and earning nothing to meet interest charges, and because of loss of use while it is being repaired. This latter may be a cause of serious loss and inconvenience, the exact amount depending upon circumstances and being very difficult to estimate; second, direct expense for labor and repair materials. In order that these two items may be kept as low as possible the truck builder must keep two things clearly in mind. First, the design of each individual part, and the material and workmanship which go into it must be the best that can be procured, in order that the breakdowns may be as infrequent as possible.

Second, the assembly and coordination of the various parts into the complete truck must be done with the accessibility of all these parts constantly in mind.

The first of the above requirements will reduce the direct expense for repair labor and materials, and the second will make possible a substantial reduction in the time required for repairs and renewals, which will mean a saving in labor and also in overhead expense. It

must be kept clearly in mind that a truck in the repair shop is an idle truck, and anything which will shorten the period of idleness promotes economy, entirely aside from the more evident saving in mechanics' time in making repairs.

I shall now endeavor to point out specifically a few points where our experience in the operation of a large fleet of motor trucks indicates that improvements are needed.

Ignition a Weak Point.

Based entirely on my experience in motor truck maintenance, I do not hesitate to say that ignition is one of the weak points in the motor truck today. In fact, when a service call comes in from one of our trucks on the road we invariably send out a new magneto because we find very many times that there is where the trouble lies. This does not apply, of course, in cases where the drivers know where the trouble is, but only in cases of motor trouble, the exact nature of which the driver does not know. In other words, motor troubles are due to faulty ignition more often than to any other cause.

With the possible exception of poor or inadequate lubrication there is probably no condition which contributes more to rapid motor depreciation than faulty ignition. Carbon accumulation, dilution of crank case oil, fouled valves and spark plugs, and general irregular and faulty performance are all chargeable to poor ignition. All these conditions increase enormously the service labor and expense required to keep the truck in operation.

I believe that designers and builders of motor trucks should give serious attention to the improvement of the magneto. In the present state of the art it is possible, I think, to build a better magneto than is being used at present on motor trucks; one that will operate for a long time with practically no attention save lubrication. It is probable, of course, that such a magneto would be more expensive than the present equipment, but intelligent users of motor trucks would be glad to pay the increased cost if assured of a better magneto. Operating savings, due to the elimination of the many ills which follow poor ignition, will repay them many times over, the increased cost of the better magneto. Breaker box and platinum points give a great deal of trouble. Would it not be possible to make a dirt proof breaker box?

Carburetion Improvement.

There are a number of fairly good carburetors on the market, and others not so good. In my opinion the gasoline motors have by no means reached the end of its development, particularly along the line of efficient use of fuel, which is largely a carburetion problem. When 25 per cent. to 40 per cent. of all the heat in the fuel is contained in the exhaust gases, in the form of unburned or partly burned gasoline, it would appear that there is room for improvement. I believe that this improvement can be brought about, to a considerable extent,

at least, through a better control, over a wider range, of the proportions and the temperature of the fuel mixture. This control must be automatic and must be governed by the load demands on the motor, in the interest of both power and economy.

While we await the advent of more efficient carburetion equipment, the present carburetor should receive a little attention, I think, from the designer. It should be made as nearly fool proof as possible; adjustments must be few and simple, approaching the automatic operation. Also, more attention must be given to the effect which vibration has on the operation of a carburetor. Leaky floats and valves often caused by vibration are wasteful of fuel and constitute a fire hazard. Furthermore, needle valves and seats poorly designed or imperfectly made are a frequent cause of annoyance and delays.

Sealing Governors.

I believe it is the general consensus among motor truck manufacturers that a



Drivers for the Consumers Co. Are Not Left to Own Devices. They Are Told Where to Go and How to Get There.

reliable and efficient governor is highly desirable. Because of the rapid depreciation caused by high speed, the life of motor and truck depends to a considerable extent on the efficiency of the governor.

Our experience with governors is that very few of them function properly. They require almost constant attention to keep them in working order, and if they are neglected the motor will soon be running wild. The average driver likes speed and cares little about truck depreciation.

A governor must be simple in design and of the very best construction as to materials and workmanship. A better means than is now available for sealing the governor should be devised. It seems to me that a lock should be used, having a key which owner or garage superintendent can retain in his possession. This will tend to assure him a properly working motor, which is an excellent insurance against motor troubles.

Unsatisfactory Lubrication.

Lubrication of the moving parts on the chassis is usually taken care of by the installation of grease cups. In principle at least such provision should be ample, but in practice the user of the truck frequently finds that results are not satisfactory. If the filling and turning down

of the cups is made a part of the driver's duties, it is almost certain that it will be neglected. I believe that fully 75 per cent. of the trucks on the street are insufficiently or improperly lubricated, largely due to the fact that the driver neglects this important duty.

We find from our experience that it is much better to have the greasing of the trucks done in our garage, at regular intervals, by service men assigned to this particular duty. In this way the work is more systematically done and results are much more satisfactory. But even with this system a grease cup will occasionally be neglected or overlooked, especially if it is located in an inaccessible position.

The design of grease cups leaves much to be desired, from the point of view of the maintenance man. They are very often cheap stampings with coarse threads. The threads are very often crossed when endeavoring to fill and replace the cups in some inaccessible place, and as a result the cup is ruined. Also, constant vibration frequently jars a grease cup loose, and once it is lost it is seldom replaced.

It seems to me that if a grease cup could be developed along the lines of the self-feeding compression type, lubrication would be much more efficient and maintenance expense materially reduced. If such a cup were developed it would probably be necessary to use greater care in selecting a lubricant properly adapted to the weather and temperature conditions under which the truck operates. But this can be taken care of by the garage or service department, and need constitute no valid objection to a substantially automatic grease cup, if such can be designed by the builders' engineers.

Non-Skid Devices.

My experience indicates that attention should be given to the equipping of truck wheels with non-skid devices for operating in mud, snow or ice. Many manufacturers make no provision for any device; others have made attempts, but I know of no successful solution of this important point. I have sent trucks out in the morning equipped with six chains on each rear wheel; at night they have come back with only one chain left. These chains are very hard on tires and springs, and impose serious strains on worm gear drive axle. The maker who can solve this important problem will make a valuable contribution to the truck industry.

In connection with the above, I believe that some serious thought should be given to the question of cushion wheels. I am not prepared to make suggestions on this point, but believe that a good cushion wheel is much to be desired.

Value of Accessibility.

A motor truck is a compact, highly specialized piece of machinery, and when the final assembly is complete it is almost inevitable that some of the parts should be extremely difficult to get at. In order to save time in making repairs and renewals, all these parts which from

their nature are most likely to need attention must be readily accessible. Among these parts the following may be mentioned.

Motor.

The motor should be installed in such a way that it may be readily taken down for repairs. We have trucks from which the entire motor may be removed by two men in 1½ hours, and we have others which would require three times as much labor for the same job. Some motors are built so that the bottom half of the motor case is readily removable, providing access to crank shaft and main connecting rod bearings with a minimum of labor. This is important, because as every maintenance man knows, the labor of taking down a motor and reassembling it after the repairs are made is often the largest part of the job.

Transmission.

The above considerations in regard to motors also apply to transmissions. Also, from our experience it seems that very few makers using a transmission amidships make any provision for filling or inspecting it, except through the top. If any other than a dumping body is placed on the chassis the transmission is inaccessible, and if something goes wrong the body must be removed to get at it.

Magneto.

As pointed out earlier in this paper the magneto is a frequent source of trouble, and must be repaired or replaced. Consequently, the magneto must be readily accessible, and also the shaft or other means of driving it. The removal of the magneto necessitates disconnecting it from the shaft, a difficult job in an inaccessible place.

Water Pump.

Frequently the water pump is placed in such a position that replacing becomes extremely difficult. Both pump and magneto may be driven from the same shaft, located where it is readily accessible from end to end. Some designs place this shaft in a transverse position in front of the motor, which in general provides greater accessibility than when it is placed in a fore and aft position by the side of the motor.

Grease Cups.

A grease cup located where it cannot be reached readily is little better than no cup at all. I believe that until automatic grease cups are devised, motor truck builders should do everything in their power to so design their machines as to make the grease cups easy to reach, so that replacing, filling and screwing down can be done with a minimum of time and labor.

Operates 159 Trucks.

I have been asked to speak also of the care and maintenance of motor trucks. This is rather a wide subject, and I feel that I shall be telling some of you things that you already know.

Consumers company operate 159 motor trucks. These trucks cover the entire district of Chicago and outlying districts, and each day are delivering coal, ice, building materials and other supplies. Keeping these trucks on the

road, cutting down expenses, making the maximum haul at minimum cost, in other words, is my job. Naturally, in the pursuance of this work, we are always on the lookout for every possible place at which we can effect a saving. It has been our experience, as I will go on to tell you, that in no place is the expenditure of money more justified, or does it bring greater return, than in keeping our fleet AWAY from repairs. I mean by this, treating all our equipment with such inspection and nightly adjustment that it is kept constantly up to a high level of mechanical efficiency. This means, to be exact, that as little time as possible of a truck is spent in the garage, or out of active work. I will show you how we have constructed our organization in order to bring this about.

I shall not go into details over the truck on the road, the routing, or the means by which we keep in touch with our equipment while it is moving. The modern loading and unloading devices have already shown their efficiency, so I shall not speak about them other than to mention that in our larger yards we load by overhead locomotive cranes that are capable of loading from two to 10 tons in two minutes. The time taken for our trucks to get into the yard, get their load and out again is usually under five minutes. As some of our trucks make us as much as \$1.20 per ton, you can readily see our anxiety to keep them moving. A truck standing still earns no money.

Garage and Shop Equipment.

What I do want to talk to you about is our garage and shop equipment. Here is the power behind the throne. This is where the trucks are kept fit. The prize fighter knows no better training quarters than our heavy duty trucks. It is here that the very backbone of our system is kept nourished. Without proper maintenance a truck cannot bring in the profit that it should. "All the trucks on the road all the time" is our motto; we try to live up to it.

Here is where we differ from the modern acceptance of repairs. "The chief part of maintenance," as some put it. He is a poor doctor who will let his patient get in such a condition that the only thing that will save him is an operation. It is just as poor policy to let the first attention you give a truck ailment

be a repair. Then the damage is already done and your truck will suffer forever afterward as a result—no matter what reparation you make to the injured part. It is the ounce of prevention that pays.

Let me emphasize this statement—strongly. Nearly the whole of our energies are devoted to keeping the trucks from ever getting in such shape that they will need overhauling. Does it pay? I'll say it does. We have some trucks that have gone over 70,000 miles and are, as near as we can tell, in as good a condition as the day we bought them from their manufacturer. There are some that are more than four years old and show no evidence of wear. Does this speak for the wisdom of our system? That's giving old Daddy Depreciation a pretty stiff punch where it hurts him.

Prolonging Truck Life.

Trucks on the road are constantly under a stress and strain. This tends to make their lives shorter than any other kind of transportation machinery. It is this depreciation that we fight. In prolonging a truck's life we reduce our cost per mile of haul with that truck.

We have not effected these results without expense. Some of them have been fairly high and were some time in proving their value, but we are reaping the crop now. I do not think that you will consider it boasting if I say that I think we are delivering coal and ice cheaper than anyone else in the city of Chicago.

Our garages have been the subject of great care and thought. A great deal of our work is done at night. We have built them with an eye to two aims; fast work and good work. Here is where these trucks are washed and inspected each night, and I might say that each truck gets this each night.

Clean floors and walls of fireproof construction add to the appearance and reduce our fire risks. All inflammable gases are taken out through the wall construction. There are plenty of windows for pure air, and there are few shadows. Also there are no columns to get in the way of truck or man. The floors are stripped for action. You must remember that we have over 159 trucks and each one of these trucks has to receive an inspection, wash and general cleaning



One of the Heavy Duty Mack Trucks Used by the Consumers Co., with Trailer. This Outfit Can Empty a Freight Car in Jig Time.

every night in the year. This inspection is nothing in the way of a casual "once over"—but a careful looking over of each truck as it is checked in at night.

By keeping our floors clean and well drained, our men are able to wash a much larger number of trucks than they would in the same time on a floor with bad drainage. Our washing and draining systems are so arranged that it is possible, in case of necessity, to wash any truck wherever it stands in the building. Our rule, however, is to have all trucks sent to the special washing floor. This floor is free from shadows as far as can be made possible. This gives the man ability to see his work so that he can get it done faster and better.

Our plumbing system is arranged for both hot and cold water. Steam boilers keep the soap and water, as well as suds, at the correct temperature at all times during the washing period. This was a large expense in plumbing—but a huge saving in labor cost is the result.

To avoid sewer stoppage we have large catch basins. These are cleaned every seven days. As tons of dust are washed out of the trucks, care is exercised to keep this from getting into these basins. The floors are cleaned with large scrapers so built that one man can handle them. This done, the floors are washed, and this is done every day.

Cleaning Aids Inspection.

You will probably think that I am spending quite a long time getting my subject cleaned, but it is necessary, for now we come to the inspection. A good deal of the cleaning is done to bare the surface of all the truck and mechanism so that the inspector can see if there is anything wrong. A hundredth of an inch of coal dust can cover up a multitude of troubles.

Our inspectors have good eyesight. If through laziness they become blind, they also fall heir to another situation. The mechanics go over the truck every night, tightening brake bands, straightening mud guards and checking up on all the little things that may go wrong with the truck, and catching these flaws before they develop into serious troubles. But back of them all is the inspector and his assistant. The driver's trouble card has

already eliminated any truck that has shown any minor or major trouble, and it is these trucks, apparently in good condition, that the inspector searches through to find the trouble that is brewing. That is where the ounce of prevention comes in. This inspector and his assistants cover all the trucks once every month. Not one single part being overlooked. This man has a printed form covering all parts of the truck. The inspector covers the motor in detail; the spark plugs are adjusted and compression of each cylinder is taken. In this way we are better able to tell when the cylinder needs regrinding.

The transmission is gone over as to the condition of the gears and if necessary filled to the level, with grease; the clutch is carefully tested; universal joints are Alemite equipped, which saves a great deal of time in filling; and we never find one dry. The wheels are taken off and bearing cups and cones are cleaned and gone over carefully for worn or defective parts. Before assembling a fresh supply of grease is put into wheels, and bearings very carefully adjusted. Since installing this system of looking after bearings our wheel bearing trouble on the street has disappeared. All grease cups are checked up to see if the men doing this work are doing it efficiently. The cooling system is closely checked, also rear ends and tires are checked up and their condition reported. The hoist and body is also covered.

By the way, it may interest you to know that it costs as much to maintain one of these dump bodies with hoist per year as it does all the rest of the truck. This inspector's card also shows if the motor is being kept clean, if the truck is being washed; everything must be in perfect shape or reported for repairs so when this card is turned into the office it shows the mechanical condition and appearance of the truck. If you had a passenger car—your own—would you like it to get this treatment every month? Would it pay you?

Greasing and Oiling.

Now comes the slippery subject of greasing and oiling. Just as we have one man to wash from 12 to 15 trucks, so we have one man whose sole aim in

life is the greasing every night of from 15 to 18 trucks. That's his job, and on the proper performance of his job, to a great extent, rests the proper performance of our trucks. Grease, grease—and then a little more grease; that is our motto there. It pays us.

I will give you an example. Springs! How many operators pay any attention to them?

Practically none that I can think of. With us this is an important item. Every spring is washed down with waste oil. As a consequence we have practically no spring trouble; and this in face of the fact that the majority of our equipment is 7½-ton size, carrying 33 per cent. overload day in and day out. When we take a truck down for its overhauling we invariably find the spring leaves well separated, with no rust present and lots of grease worked through. Under similar conditions on most trucks you will find spring leaves frozen together into a solid mass of rust and metal. Such a spring lacks resiliency. This means a saving that is somewhat hidden at first thought—the saving on tires.

Please do not think that I am standing up here just telling you how good we are, I shrank from this speech like the devil did from holy water, but now that I am here I want you to understand that if I may seem to be laying too much weight on the success of these methods and ideals that we have followed, it is only because I want to help you in any little way I can; and that I wish to tell you that they are successful. It is just our experience that I am putting before you.

Now sometimes, strange as it may seem, even our trucks will get out of order. In other words, won't run. If this happens on the road we have service cars—two of them—that will either go out and make the truck run or else tow it in. We do not allow our trucks to "limp in."

Minor Repairs at Night.

Minor repairs are made by mechanics capable of doing most any kind of a job with a reasonable amount of speed and accuracy. This is done at the garage—during the night.

Jobs that would consume several



A Corner of the Huge Garage Which Houses a Large Number of the 150 Trucks in the Service of the Consumers Co., Chicago, Ill.

hours or more are listed for the shop. This shop is always in the hands of an experienced man. In the laying out and building special attention was paid to ideal working conditions; making the men happy—of which I will have more to say later on, and good light and ventilation mean good work.

In the selection of tools and equipment a study is made of each individual operation to find the best means of handling it. If after careful analysis is made, it is found that tools or machinery will make a saving, these tools are installed. Without great care in the selection of machinery and tools it is an easy matter to fill up valuable space with machinery that will not pay the interest of the investment.

Handling of Parts.

From our stock records we are able to know just what parts we are apt to use in our garages during the night. Having this knowledge eliminates carrying all unnecessary parts, thus saving a large sum of money and time in keeping the record of these parts. The main stock room is connected with our shops and carries everything that goes into the truck. Our garage stock rooms draw on this one for all parts.

Our shop equipment consists of shapers, milling machines, air hammers, drills, drop hammers, special reamers for all bearings, wood working machines and machines for painting. As we have been able to standardize our automobile equipment to a great extent, we are able to save in shop equipment, as well as in

our stock of parts. This is an example of standardization.

The shop has on hand at all times an extra motor ready to go into a truck in case a truck comes in with trouble that would necessitate taking the motor out. The extra motor is put into the truck which goes out and to work while the motor taken out is repaired and put into stock, prepared for a similar case. This liberates an investment of some \$8000 to keep on with its work at earning money for us.

Our machinery equipment is so laid out on the floor of our shop that repairs can be routed through in the most efficient manner, thus saving the time of rehandling and doubling back to the same men.

We have extra electric motors and batteries for electric trucks, extra wheels for both gas and electric trucks, com-



The Consumers Co. Is Strong for Labor Saving Equipment.

plete steering posts; in fact, any unit that our experience has taught us will save time and keep our trucks moving at all times

Our stock room is so arranged with bins, etc., that we have a perpetual inventory. In this shop there is no kind of a job around a truck that cannot be handled, as well as motor, transmission and chassis repairs. We also make cabs, steel and wood truck bodies and also handle our own painting.

Care of Human Machines.

All our men are most carefully selected. We treat them well and they know it. There is always a waiting list of applicants and by having always this quantity to pick from we get a good type of man. There are factors in human nature that work against efficient organization and there are those that work strongly for it. Pride and contentment are our aids and these we try to build up in our own men.

Perhaps what I have said today has not been efficiently specific. It may be that I have attempted to cover too much ground. I hope not. It is quite possible that some of you will think that we have built up too big an overhead for our equipment. I can only assure you that I have given you the honest result of our experiments and experience. It is more economical to spend money in the prevention of trouble than it is to let the opportunities for saving slide by, gamble against the law of averages and then, in the end, pay the same amount of money and more to repair defects.

HOW RESOURCEFUL SALESMAN BUILT OWN MARKET

M. K. Gorham, a star salesman for the Battle Automobile Co., distributor of Transport trucks for Central and Northern Michigan, is one of those to whom a quiet period in truck business is only a challenge to his resourcefulness. If truck prospects are few the problem is simply to make more truck prospects. If prospects are apathetic the job is to make them enthusiastic.

On the first part of the proposition—making more truck prospects—Mr. Gorham says:

"Hauling is one thing that goes right on through every period—in city and country. Where there is hauling there is need for trucks. The salesman that does not know that truck hauling is more economical, more efficient and more profitable than horse hauling in 90 per cent. of cases, ought not to be in the truck business.

"Yet motor hauling has just begun. Not until 90 per cent. of all hauling is done by motor trucks can any salesman say truthfully that the field is covered.

"This suggested to me that now is a very good time to interest men in motor haulage as a business of their own. You can find men who are not satisfied with the business they have or are tired of working for somebody else. Locate the right kind of men who are in these moods and you have capital prospects.

"Often it is necessary to point out to them where they can get the trucking

business. A little study of the local situation gives one a line on this; but the salesman should be definite. The prospect wants to know where and what the business is.

"This argument works out just as well with men who are already engaged in handling business with horses."

A Striking Example.

Mr. Gorham gave a striking instance of this in Reed City, Mich.

"Ernest Johnson, the transfer man, was a very difficult proposition so far as trucks were concerned. Several attempts to sell trucks to him had been fruitless."

But Mr. Gorham, undismayed, held another long session with him. Finally Mr. Johnson exclaimed:

"Tell me where I can get enough hauling to make it profitable for me to own a Transport, and I'll buy one."

"Very well, be at the hotel tonight at 8 o'clock," answered Gorham.

The salesman had at that time no definite plan of action for lining up hauling jobs, but he began immediately. One interesting bit of information was that there was some difficulty in transporting farm produce from Luther, a nearby town, to Peacock, 13 miles distant, owing to the fact that the railway had been taken out.

Calling on the people interested, Gorham ascertained that motor truck service between these cities would be most

welcome and that the pay would make the job worth while.

On further investigation he found a job of moving five carloads of brick, another hauling 3000 yards of gravel for road construction work and still another transporting a large quantity of lumber.

When he met the transfer man at the hotel that night, Gorham presented an array of facts and figures which convinced the prospect that, conservatively estimated, a Transport Model 50 truck, for 5000-pound service, could be made to earn him an average of approximately \$15 a day net. Realizing, of course, that he could ill afford to ignore such alluring prospects for the expansion of his business, Johnson decided to invest.

The Happy Afterwards.

Results of this venture more than came up to the picture painted by the salesman. The truck paid for itself in little more than six months, and at last reports Johnson's business had increased to such proportions that he expects soon to add another Transport truck.

Men the country over, by means of a motor truck, have established themselves in permanent, profitable businesses, and this with comparatively small investments.

There is no question that educational salesmanship can accomplish much during the next few months to maintain a profitable volume of business.



Selling the Industry Back to the Manufacturer

Some makers of trucks, parts and equipment who would sell the industry to the public must first be sold themselves.

There is clear and unmistakable proof that there are manufacturers of power vehicles and their auxiliaries who lack faith. An entire shutting off of production and an absence of arrangements to get under way until adequate orders are actually in hand intimate that some factory heads are lying down on the job.

The old adage "out of sight, out of mind," smotes the industry hip and thigh.

ADVERTISING IS FIRST AID TO MERCHANDISING.

At the first slackening of industry a number of manufacturers immediately called a halt on advertising. The buying public wonders whether these concerns have voluntarily retired from business. Their products are out of the public eye, and can only be restored to their old place in public esteem by renewed publicity efforts.

Meanwhile, the dealer wonders if his factory has shut up shop for good and wonders, too, if it would not be better for him to shift his activities to some product which carries the backing of the maker. This same dealer has been urged to advertise and has been told that the manufacturer will stand behind him to the limit.

This dealer is wondering, also, why the factory does not practice what it preaches. He is guaranteeing a year's salary to one salesman that totals more than page advertising by the year in any one trade magazine would cost the manufacturer.


Is it strange that this seeming lack of confidence in the industry—this failure of the factory to put out for the good of all its dealers a part of the sum one dealer pays a single salesman—makes the distributor, the dealer and the salesman stop to think, makes them oftentimes doubt the cause they serve and robs them of the zeal and ardor which foment sales and piles up business.

ADVERTISING IS THE FORM OF BACKING THE DEALER NEEDS MOST AND APPRECIATES MOST.

In its new publicity drive the industry would do well to offer a bargain. Sell prosperity and the industry in one package.

There are truck attributes of which the market knows naught. Not one should be overlooked. There should be a message in every advertisement. The quality of text submitted for editorial reproduction should be high, with education as its motif. Say something or waste-basket your output. When you can't inform don't deform.

The automotive industry is right now feeling the change in the business atmosphere. The sale of a truck is no longer a sensational incident. The shows have done their share to



push ahead the day of brisk trading. First came the New York and Chicago events, beauty shows—an appeal to the eye. Then the highway transportation show at New York and the national tractor show at Columbus, splurging on education—an appeal to the mind. Then the St. Louis, Kansas City and Minneapolis exhibitions, stressing service, utility and economy—an appeal to the pocketbook. And, after all, the pocketbook is the target at which all business activities aim.

At Kansas City 375 sales of cars and trucks were made, every one of the 74 exhibitors making at least one. That result tells a story. There will be a bookful of such stories to record after the coming Boston exhibition, always a selling show of the first magnitude. The Boston show will strike a knockout blow at depression and place the industry again on the active list.

THE BASIC INDUSTRIES ARE AT WORK.

Clothing and shoes are being made in almost the usual volume. These factories are operating to fill orders, which means that people are buying and that general business is nearing normal. A new administration went into power a few days ago. This change begets a confidence that augurs well for business. Tax reforms, a protective tariff and other remedies are counted upon to quickly right what is amiss with the people.

The wonderful winter season that is with us has shortened truck life and ensures more replacement demands this spring than ever before. This is to be a year of construction. Roads and buildings must be built. The money is available in most cases and in many instances the work has already been ordered.

THE NEED FOR TRUCKS WAS NEVER MORE URGENT.

Who will say that the balance of 1921 will not be the greatest selling era the truck market has known?


Visit all the savings banks in your territory. You will find that savings deposits are as large or mighty close to being as large as 12 months ago when vehicles sold themselves. The answer is that much of the ills of the present day are imaginary and that the buying power of the public is as potent as a year back when people waited in line for transportation equipment. The desire for ownership is as great as ever. This desire must be whetted to a point where the man with money in the bank can be shown that a truck is full equivalent for the coin he holds.

The man who has goods to haul, whether manufacturer, merchant, contractor or what not, has learned the lesson that the truck is a saver of time, money and labor for him. He knows that the truck is as necessary a piece of equipment as any machine in his factory. He knows that the truck is as vital to his business as the laborer who toils in his mill or the materials which go into his product, if he would be efficient and progressive in his field.

He knows all these things or he ought to know them. If he doesn't the industry should tell him. If he has money to hire labor and buy materials he has money to buy trucks.

HE WHO WOULD CONVINCE MUST FIRST BE CONVINCED.

The manufacturer must sell the industry to himself, then to the distributor, dealer and salesman. Selling the industry to the public—once the organization is sold solid from factory to the last selling line—is mere routine.



WARNER $\frac{3}{4}$ -TON TRANSMISSION GEARSET

The Warner Gear Co., Muncie, Ind., is in production with two new gearsets which the engineering department has developed after a period of experimental work which demonstrated that the gearsets are more than ample for the work in hand.

The $\frac{3}{4}$ -ton type is designed for trucks having a capacity of $\frac{3}{4}$ to one ton, while the $1\frac{1}{4}$ type is suitable for trucks having a capacity up to this tonnage. Both gearsets are intended for use on the new types of speed wagons which the manufacturers in general are building for the 1921 season.

A description of the $\frac{3}{4}$ -ton job will suffice for the $1\frac{1}{4}$ -ton type, as both are similar in construction, differing only in the dimension of parts.

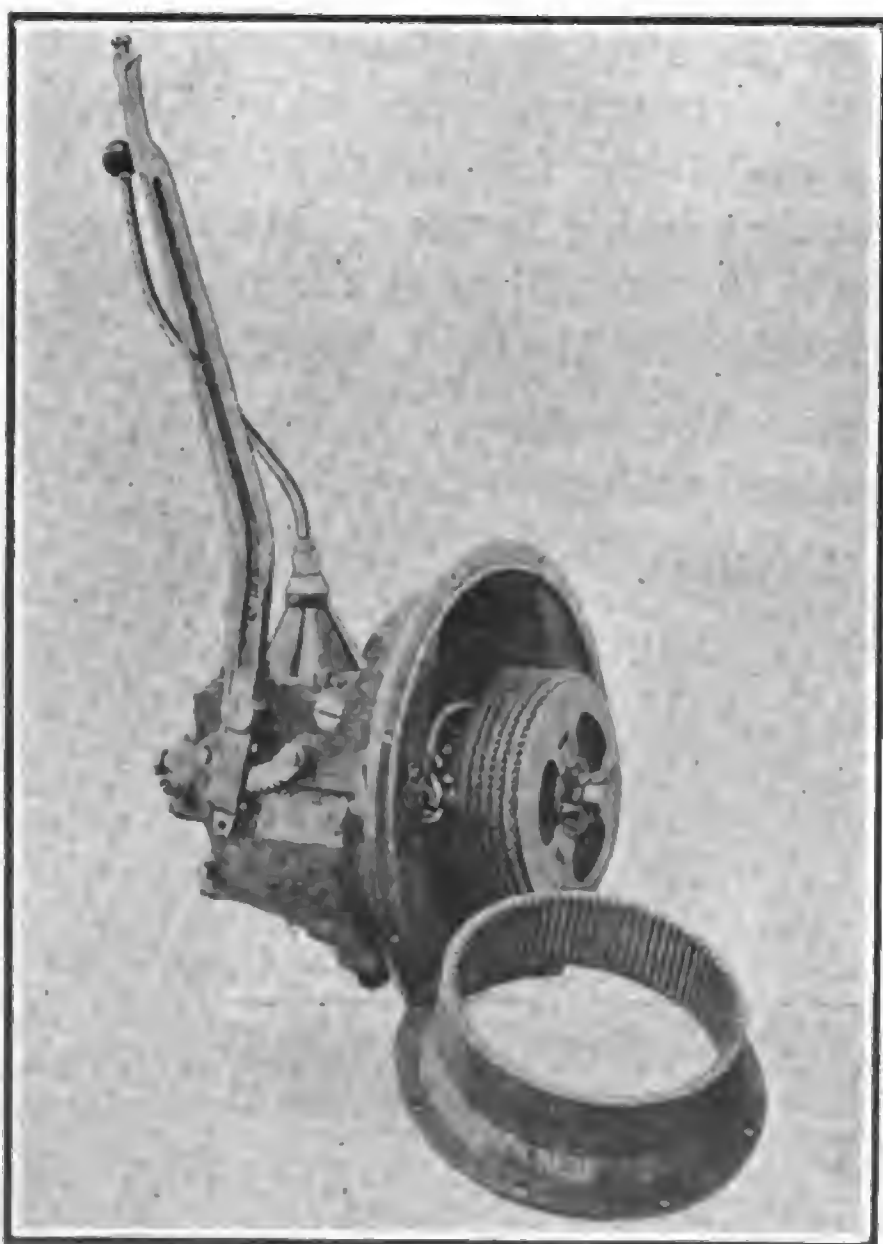
Designed for Unit Construction.

The unit is designed for use with a multiple dry disc clutch located between the engine and gearset, and provision is made for supplying lubrication by a flexible tube in the outside bell housing. The latter supplies lubricant through a drilled hole central in the clutch throw-out shaft, from which it falls into a pocket into the throw out bearing retainer, and from this point goes to a well on the lower side of the bearing, which it constantly lubricates.

It is intended to be used as a unit with the engine as the gearset case is made in a form which lubricates the clutch housing as well.

The speeds are selective, three forward and one reverse, operated through a cane shaft which is located on the top of gearset case in a conventional position, handy to the driver.

The gears are of heat treated alloy steel, those of the main shaft being mounted on a splined shaft, while those of the counter shaft are separately keyed, making it necessary to replace only one when replacement is needed.



Specialty Designed Warner Gearset for $\frac{3}{4}$ and $1\frac{1}{4}$ -Ton Speed Trucks.

Both main and counter shafts are mounted on annular ball and roller bearings, and designed with a view of eliminating the destructive tendencies of thrusts from external forces.

An opening at the left side is provided at the rear which allows mounting a direct acting tire pump. The speedometer drive is taken from the rear of the main shaft and is enclosed in a dust proof housing, lubricated from the gear box. A large hand hole in the top of the clutch chamber allows adjustment of the clutch member.

An oil filler plug is provided on the left side of the case, which gives the proper level of lubricant in the gearset.

The Warner $\frac{3}{4}$ -ton unit is constructed in the same careful manner, from the best material obtainable, as the larger units manufactured by this company, and longevity, simplicity and lightness are characteristic of the new models.

TRUCK SALES MANAGERS AS A BODY READY TO ASSIST DEALERS

The National Association of Motor Truck Sales Managers is definitely committed to the work of assisting dealers in the reorganization of their affairs in order that all possible selling force may be concentrated in the task of helping to bring truck sales volume back to normal.

At a recent meeting of the directors held in Chicago a comprehensive programme was laid out for accomplishment in 1921. It is believed that the scope of activities will be considerably broadened, but definite plans have not as yet been announced.

One of the directors, Homer Hilton, who has just severed his connection as sales manager of one of the prominent four wheel drive truck companies, was elected "managing director" and has assumed active charge of the association's affairs pending the selection of a general manager. Mr. Hilton, it is said, is making an analysis of the past work of the association, and will shortly submit to its members a definite plan of procedure which it is thought will create a closer bond of cooperation between factory sales departments and truck dealers.

The Sales Managers' association was organized two years ago for the purpose of correlating factory sales policies with the local needs of truck dealers, in the belief that closer harmony of operating plans would spell greater success of the motor truck industry as a whole. This work has progressed with even more satisfaction than was considered possible.

The association officers and their connections are as follows: President, H. T. Boulder, vice president and sales manager, Selden Truck Corporation; vice president, E. T. Herbig, sales manager



Homer Hilton, Managing Director, National Association of Motor Truck Sales Managers.

Service Motor Truck Co.; secretary-treasurer, A. E. Schafer, sales manager Gramm-Bernstein Motor Truck Co.

FARMS SHORT OF TRUCKS, N. A. C. C. SURVEY SHOWS.

The Motor Truck Committee of the National Automobile Chamber of Commerce, F. W. Fenn, secretary, is supplying a highly productive service through a series of surveys of truck needs by farmers in various states. Survey completed by the committee last week indicates 2761 farmers are using trucks in Maryland at the present time. As there are 47,908 farms in the state there is a large opportunity for sales. Preferred size of trucks is one ton.

Of the 24 counties reporting in Kentucky 13 stated there was a real need for more trucks immediately. Preferred size is one ton. Only 213 trucks are owned in the state, distributed over 16 counties. Ten counties have no trucks at all. There are 78,843 farms in the state.

There are 4700 trucks in farm use in South Dakota. Fifty-three per cent. of this total are in southeastern part of the state; northeastern section of state, 31 per cent. of total. In area west of Missouri river there are 16 per cent. of total. The survey also indicates that the demand for trucks on farms will increase from now on, as farming is becoming more and more diversified.

UTICA AUTOMOBILE WEEK.

All Utica, N. Y., dealers in trucks, tractors, cars and accessories participated in "Utica Automobile Week" from Feb. 23 to March 5. An extensive advertising campaign in and around the city preceded the event. All of the dealers had attractive displays in their places of business.

NEW ATLAS AXLES STURDILY BUILT

ENGINEERS of the American Machine Co., Newark, Del., have developed a type of rear axle after an extended period of experimenting both in the factory and on the road, which, they maintain, embodies all the features necessary for a truck axle to successfully bear the pay load and truck under any and all operating conditions.

Five features were sought by the engineers as follows: Maximum rigidity with minimum weight; maximum road clearance; freedom from lubrication troubles; accessibility of working parts, and small reduction in bevel gears.

That these features are found in the new Atlas axle designed especially for commercial vehicle work in trucks of two, $3\frac{1}{2}$ and five tons capacity is announced.

The axle shown in the illustration is the correct size for the $3\frac{1}{2}$ -ton truck and differs from that used in the two and five-ton capacity trucks only in dimensions.

The salient features of the Atlas design include a one-piece cast steel load carrying member, a box girder of light weight and great stiffness, enclosing and protecting the jack shafts. A high differential mounting provides maximum road clearance. The straight line propeller shaft drive is easily accessible.

Perfect lubrication is provided, as all gears and bearings operate in an oil bath, obviating the necessity of using grease cups, and the claim is made that there is no leakage from the axle. Both brakes are of the internal expanding type, of large size and having wide braking surfaces, are operated by a wedge, completely enclosed and very accessible for adjustment without disturbing the brake linkage.

The wheels may be easily removed by simply loosening and unscrewing the studs which hold the hub caps in place and inserting a one-inch bolt in the hub center to act as a wheel puller. Malleable cast wheels are regularly furnished complete as essential parts of the regular equipment.

Double Reduction Internal Gear Type.

After conducting a series of exhaustive experiments the American Machine Co. decided that the internal gear type of double reduction was the best that could be developed for the new Atlas axle. The driving shaft is located at the uppermost point in the gear circle, the result of which is to raise the differential and the propeller shaft, and thereby increase the road clearance and decrease the angularity of the propeller shaft.

From an engineering standpoint, having disposed of the method of drive, the problem reduced itself to the design of the member to carry the load and provide for the mounting of the power transmitting members. An axle is subjected, it is claimed, to two distinct classes of stress, one imposed by the load applied vertically at the spring seats, and the other due to change in momentum ap-

plied in the form of torsion at the spring seats. To resist these with maximum efficiency the section of the supporting member must be so chosen as to take these loads with minimum fibre stress. Considered in this light, all forms of solid members were immediately eliminated in favor of some form or another of hollow construction.

Having decided on hollow construction, the choice reduced itself roughly to one proportion between the width and depth. The assumption that the horizontal components of stress are equal to the vertical components is not true in the case of heavy duty trucks, Atlas engineers declare. Therefore, the Atlas load carrying member or housing was chosen oblong in section with the long axis in the vertical plane.

The use of this section also has the advantage of providing space within the housing for the driving shaft, so that without any extra complication all the working parts are perfectly protected from accidental damage due to contact with obstructions on the road. Their alignment is assured and the construction of the axle as a whole is greatly simplified.

Maximum Road Clearance.

Using the double reduction internal gear drive with the driving shaft located inside the housing and at the uppermost point in the gear circle, makes it possible to construct the axle with maximum road clearance. In fact, the clearance is so much greater than other forms of axles now in general use that smaller wheels can be used without reducing the clearance to within several inches of the maximum now available. As a concrete example, the clearance of a $3\frac{1}{2}$ -ton truck equipped with 40-inch wheels and a worm gear drive was increased by $6\frac{1}{2}$ inches by substituting an Atlas axle with 36-inch wheels. In this particular case

the difference in clearance was $8\frac{1}{2}$ inches.

No Lubrication Troubles.

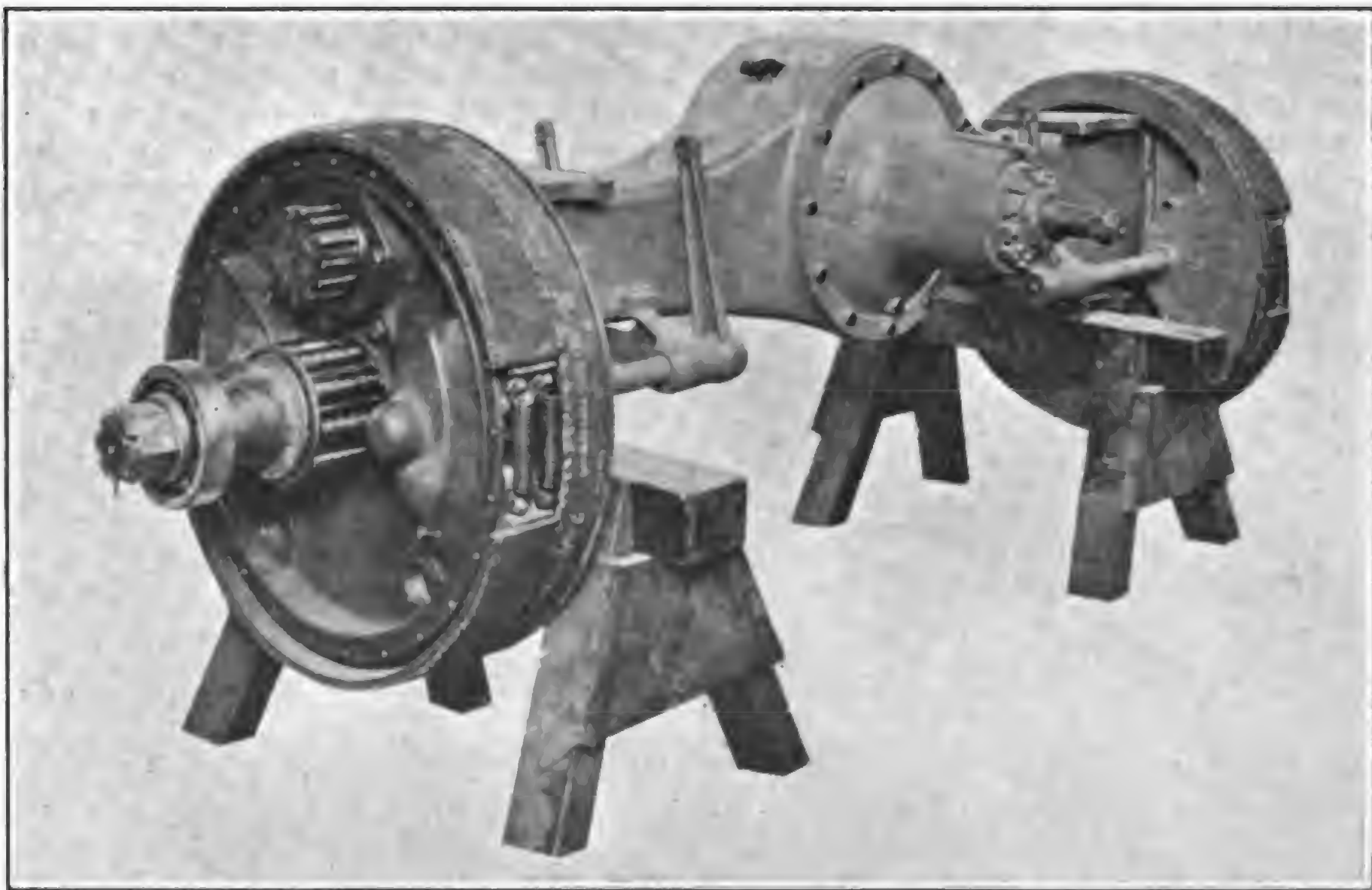
Experience shows that it is not sufficient to design an adequate lubricating system unless provision is made for consequences that may result from failure to operate the lubricating system as planned. In short, in order to be successful, the axle must be so designed that no serious damage will result from gross neglect on the part of the driver, and those who have the care of the truck in charge.

In order to meet these conditions in the Atlas axle some radical departures were made from conventional axle design. First of all, the differential and bevel gears are completely enclosed in a separate carrier and run in oil, the level of which is well below the center line. No oil or grease is carried in the housing proper.

The annular gear in each wheel runs with its lower side immersed in oil, and lubricates the pinion and the various bearings entirely by oil carried up from the bath at the bottom.

The lubrication of all gears and bearings is derived from these three oil baths, one in the differential carrier and one in each wheel. Three plugged openings large enough not to require the use of a funnel provide for renewal of oil, which takes place at extended intervals. Claim is made that even should the oil be allowed to run out entirely no serious damage will result unless the truck is so operated for a prolonged period. There are no grease or oil cups on the axle to require attention of the operator.

By designing the working parts in such a manner that they are completely protected in dust-proof enclosures and provided with ample oil lubrication, the designers of the Atlas axle feel that they have produced a construction which



Atlas Heavy Duty Axle, Front View, Showing Accessibility of Units, Size of Brakes, Etc.

practically eliminates any possibility of trouble due to neglect on the part of those in charge of the lubrication of the truck.

Accessibility of Live Parts.

Especially attention has been given to accessibility, particularly at the differential. The removal of eight cap screws on the rear cover plate flange exposes the entire assembly for bevel gear and pinion adjustment. Inspection of the gears is accomplished by taking out eight more cap screws, permitting the rear half of the carrier to come away. Then, too, the entire gear carrier is readily removable as a unit. The wheels are quickly detached by withdrawing 12 hub cap screws and using a one-inch bolt in the center of the hub cap as a wheel puller. With the wheel removed the oil enclosing diaphragm and hub are now in position to be dismounted, which will leave the gearing wide open and permit the withdrawal of the jackshafts.

In the Atlas double-reduction internal gear drive the advantages of all the different types of construction have been incorporated and to these there has been added the extra road clearance derived from placing the driving shafts at the top of the gear circle instead of at the side or in the center, and by elevating the housing so as to enclose the driving members, the working parts are protected from all danger of damage or collision. The Atlas construction also eliminates the use of any material for the protection and support of the working parts that is not sufficiently applied in supporting the load.

Details of Axle Construction.

The standard gear ratio supplied with the Atlas axle is 9.77 to one, which allows an engine speed at 12 miles per hour of 1094.63 revolutions a minute. The main wheel bearings are Hyatt, the wheel thrust bearings, SRB annular ball and all others, Gurney annular ball, radial and thrust. The brake shafts operate in Bound Brook oilless bushings.

The driving members consist of a Powrlok differential mounting, 36 tooth, four-pitch bevel gear. The bevel pinion is 17 tooth, four-pitch. Both gears are made of 3½ per cent. nickel steel. The jackshafts are 3½ per cent. nickel steel, mounting 13 tooth, 4/5 pitch, 1¼-inch

face, hardened, chrome nickel, spur pinions.

The brakes are both internal expanding, completely enclosed, but readily accessible for adjustment. The brake bands are anchored at each end, of full wrapping type and actuated by a split wedge. They are adjustable for wear by expansion of the wedge without altering the linkage. The service brake is three inches by 21 inches and the emergency brake two inches by 21 inches.

The load carrying member of the axle is a malleable iron box girder, a one-piece casting of extreme stiffness and weighing but 181 pounds, fitted with detachable spindles of heat treated chrome vanadium steel. These spindles reinforce the carrying capacity of the housing under the spring seats.

The hubs are of malleable iron, fitted with 60 tooth, 4/5 pitch, 1¼-inch face, chrome nickel steel, heat treated, with internal gear rings bolted on.

The wheels are of malleable iron fitted with brake drums cast integral and essentially part of the axle. The location of the gear ring and pinion in the plane of the wheel rotation, together with the neutral position of the pinion, relieves the wheel bearings, it is claimed, of all twisting moments resulting from torque.

The two and five-ton models are similar in every respect, except for the dimensions, bearing sizes and gear ratios, which are chosen to fit the particular requirements of each case.

COMMERCE 1921 LINE OF TRUCKS COMES IN THREE SIZES

The Commerce Motor Car Co., Detroit, Mich., exhibited its full 1921 line at a special motor car display in Chicago during automobile show week. The Commerce Motor Car Co. comes before the public this year with three models, a 1500-2500 pound pay load capacity Mercantile Express at \$1450; a 3000 pound pay load capacity Special Delivery at \$1800 and the 4000 pound pay load capacity Fast Freight at \$2150. All models carry the Continental motor, electric

starter, electric lights and pneumatic cord tires. The Special Delivery and Fast Freight have a four speed transmission and units in keeping with the pay load specified for their capacity.

The same high class units and constructions that have made Commerce a leader have been preserved. The Mercantile Express has a bevel gear truck type rear axle; the two larger trucks Torbensen internal gear driven rear axle. The motors Continental, Zenith carburetor, Eisemann magnetos, Spicer universal joints. The Mercantile Express 127 inches wheelbase, the Special Delivery 130 inches wheelbase and the Fast Freight 137 inches wheelbase. The Springs of Detroit Steel Products company manufacture and frame from the Detroit Press Steel Co., Willard storage battery and the regular pioneered design Commerce radiator. Nickel radiator guards are furnished on the two larger models. The chassis and bodies when furnished at the factory are attractively painted. The company furnishes as standard equipment five types of bodies and several types of cabs.

Director of Sales and Advertising, George D. Wilcox, says: "Our full 1921 line is announced at prices which comprehend the desire in the public mind for trucks based on the lower replacement costs of merchandise. We have been studying the public's attitude and our experimental department has been at work for a long period of time on the new models. We know we come before the public with the right product at the right prices."

U. S. TRUCKS GO BIG ABROAD.

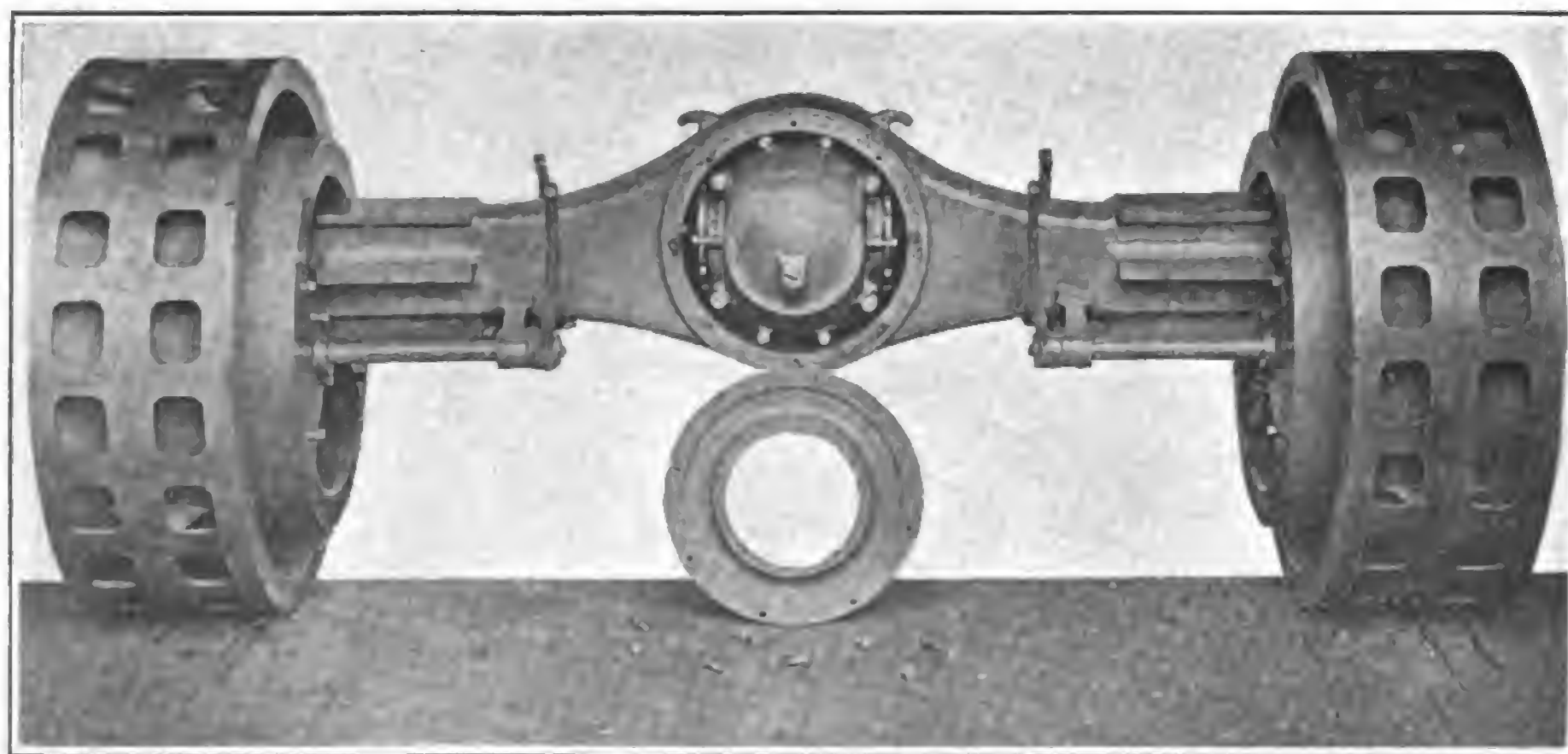
Prominent among the displays seen at the Olympic Show staged in London last November was that of the United States Motor Truck Co., Cincinnati. This was exceptionally large and complete, including chassis, tilting bodies and platform, express, char-a-banc and bus bodies, all elaborately painted and finished.

This exhibit was practically duplicated at the Scottish Motor Show, Kelvin Hall, Glasgow, from Jan. 28 to Feb. 5. The Glasgow show will be repeated at the approaching show in Edinburgh. Both of these displays were in charge of half a dozen of the company's star salesmen, together with the heads of the distributing organizations in the two cities.

United States representatives in Glasgow and Edinburgh are reported to have achieved remarkable progress. In fact, the outlook for business throughout the entire northern section of the British Isles is very encouraging and the company looks forward to a largely increased business for 1921 as compared with that of 1920.

TRUCKS AT SIOUX CITY SHOW.

Trucks and tractors were shown in great number at the Sioux City, Ia., show the middle of last month, which was highly successful from every standpoint.



Rear View Atlas Heavy Duty Axle, Cover Removed, Showing Accessibility of Differential Housing.

TRUCKS ADD TO COMFORT OF PUBLIC



One of the 212 White Five-Ton Trucks Which Bested the Big Snow Storm in New York City the Latter Part of February.

TRUCKS AND TRACTORS DO QUICK JOB ON BIG SNOW-FALL IN NEW YORK

When the storm king invaded New York city Feb. 20 and piled up 13 inches of snow on the thoroughfares in 24 hours he found that for several months the municipal forces had been awaiting such a challenge. Two hundred and twelve White five-ton power dumping motor trucks, purchased presumably for the routine removal of garbage, ashes and refuse, but mindful also of just this crisis, were quickly thrown into the breach, along with tanks, tractors and 15,000 to 20,000 men. Many of the trucks were equipped with snow plows. The blockade first yielded, then broke and finally was routed in the sewers of New York.

This was in sharp contrast to the happenings of a year ago when the city suffered an economic loss of \$60,000,000 through lack of such equipment.

HAMILTON WITH AKRON AGENCY.

L. Grant Hamilton, of national prominence in automotive merchandising and advertising circles, has just joined the staff of the Akron Advertising Agency of Akron, O. Hamilton, since the war, has been in active charge of the advertising of the Federal Motor Truck Co. of Detroit. This connection followed his discharge from army service after two years spent in France.

Prior to the war Hamilton was with the Campbell-Ewald agency. He also served as advertising manager of the Regal Motor Car Co., and was a member of the advertising and sales promotion departments of the Studebaker Corporation.

STANDARD STEEL CHANGES.

During the past six months the Standard Steel Works, Kansas City, Mo., has installed a number of improved machines, giving greatly increased capacity, with a more economic productive cost. This benefit will be shared with customers by increased and lower cost.

They have brought into the organization new men, whose experience and knowledge of the sheet metal industry will prove beneficial.

TRUCKS DELIVER NEWSPAPERS IN SUBURBS.

The Moultrie, Ga., Daily Observer is conducting an experiment which will prove interesting to the truck industry. This newspaper is using trucks in delivering papers to its suburban readers for a distance of 40 miles from Moultrie. The readers get paper the day of publication.

TRUCK NETS PROFIT AND PLEASES PATRONS IN R. R. SERVICE

When the Pittsburgh & Susquehanna Railway Co. installed a Republic motor bus on a spur line of railroad between Phillipsburg and Ramey, Pa., it did so with the sole idea of accommodating the people of the two towns, and those living along the line. The fact is, however, that the bus is earning a profit on its operation.

The chassis is the standard model 19, 2½-ton, fitted with demountable steel railway rims on the rear wheels, and the front axle and wheels replaced with a four-wheel pony truck which follows the curves. The bus seats 28 passengers in two compartments.

The bus makes four round trips per day, running on a regular railroad schedule, with 12 regular stops. There are 10 or 12 additional stops at mines, etc. The running time, each way, is one hour. There is not a mile of straight track in the entire 14, and there are several 1½ per cent. grades. Yet the Republic easily makes its schedule time and maintains an average speed of 25 miles per hour.

The railroad's report of the first 52 days of operation of the bus, shows 6032 miles traveled, gross revenue of \$2120.95, total expense of \$1522.66, and net earnings of \$598.29, or 9.9 cents per mile. The results of the bus operation have so impressed the railroad officials that a Republic trailer, with railroad rims and special box car body, has been installed for baggage and express business, and two more Republic trucks are soon to be put into service on the same line.

ARMLEDER GETS HUDDLE.

The O. Armleder Co., Cincinnati, O., has engaged R. C. Huddle, formerly of the Atterbury Motor Car Co., as purchasing agent.



Republic Truck Used in Railroad Service, Which Not Only Satisfies Patrons, but Yields a Profit.

TWO NEW GARFORD HEAVY-DUTY MODELS

The Garford Motor Truck Co., Lima, O., is now distributing its two new models of Garford trucks to its representatives. Models of both types were displayed for the first time during the recent Chicago Motor Show and were the objects of close scrutiny by operators of general utility and heavy duty units.

The new models consist of a five-ton worm drive unit and a 7½-ton chain drive unit. These two new models complete the Garford line and prepare the company to meet all haulage needs. All models are standardized to the principle of installing the engines beneath the hoods instead of under the seats as formerly.

The company expects that sales on the five-ton worm drive truck will run very heavy, as there is an unusually big market for this particular type of truck, the present model having been designed for all kinds of heavy hauling.

The truck is replete with improvements and new and exclusive features of construction. The worm drive, with clover leaf suspension rear springs, is claimed to be a vast improvement over former types of drives, as it eliminates spring breakage and all minor troubles experienced with the old style of drive. The general construction is marked by numerous features indicating the splendid advancement made by engineers in devising new ways of building strength and ruggedness into the truck.

Powered by Buda BTU Engine.

Augmenting the supreme strength and resistance embodied in this new model, is the Buda BTU engine, having a bore of five inches and stroke of 6½ inches and developing under N. A. C. C. rating 40 horsepower at a piston speed of 1000 feet per minute, giving maximum power with low engine speed. Test runs under the most difficult and unusual conditions prove that the model is capable of running 15 miles per hour heavily loaded and developing scarcely a purr from the engine.

This is emphasized as a strong feature of Garford trucks, as the engines used in the trucks of this company's manufacture have been amply powered for the work.

This model is especially adapted for

excavating, heavy dump, heavy coal and heavy loading work of all kinds. The standard job is equipped with 162-inch wheelbase and accommodates a 13 or 14 foot body for general heavy duty cartage. There are two other optional wheelbases of this model, one of 138 inches and a long wheelbase of 186 inches for the accommodation of extra long bodies.

The 7½-Ton Job.

The finishing of the new 7½-ton Garford model, claimed to be a triumph in heavy duty types, marks the entrance of the Garford Motor Truck Co. into the limited group of manufacturers who turn out this size of heavy duty trucks. The model retains the Garford chain drive, recognized as being of a very high order and is for use anywhere that heavy loads must be handled continuously.

This truck is known as Model 150 A and is a development of and an enlargement upon the heavy duty five and six-ton trucks manufactured by the Garford company for the past several years.

The outstanding characteristics of this model are its ruggedness and its clean and husky appearance. The engine under the hood type construction is used, completing the entire line of Garford models with this particular style of construction.

The leading dimensions of this 7½-ton chain drive chassis are the standard wheelbase of 162 inches; loading space back of driver's seat, 150 inches; tread front, 68½ inches and rear 77 inches, and the weight of the chassis, 10,000 pounds.

Ample Room for All Purposes.

The engine is a four-cylinder, block cast construction, having a three journal crankshaft, the cylinders are five-inch bore and 6½ inch stroke. The piston displacement is 510 cubic inches, developing under the S. A. E. rating 40 horsepower. The valves are located on the right hand side, L-head type, made of tungsten steel 2¼ inches clear in the throat, with all valves interchangeable.

The pistons are fitted with three rings above the piston pin and a scraper ring below in the piston skirt.

The crankshaft is of unusual dimensions and is very rigid in construction. The bearing sizes range from 2½ to 2¾ inches. The connecting rod is of con-

venient type I beam section 14¼ inches center to center, while the bearing cap is retained with four steel alloy belts. The flywheel is of unusual size, 20½ inches in diameter, enclosed in a No. 1 size S. A. E. bell housing. The upper half of the bell housing is cast integral with the upper section of the crankcase, while the lower half is divided, the forward section serving as the oil reservoir. The upper half of the crankcase is cast separate from the engine cylinders and has a forward extension which houses the timing gearset. The flywheel housing lower half is separate from the oil base, which greatly facilitates bearing inspection.

Detachable heads are provided for the top of the engine cylinders, which is similar to construction used in the lighter models.

Auxiliary Equipment.

The carburetor is a Stromberg 1½ inch. The fan is 22 inch, four-blade steel construction mounted on a large size Hyatt roller bearing, and the fan drive is by a two-inch flat belt. Ignition is by a high-tension magneto, using the impulse type coupling, and one set of plugs.

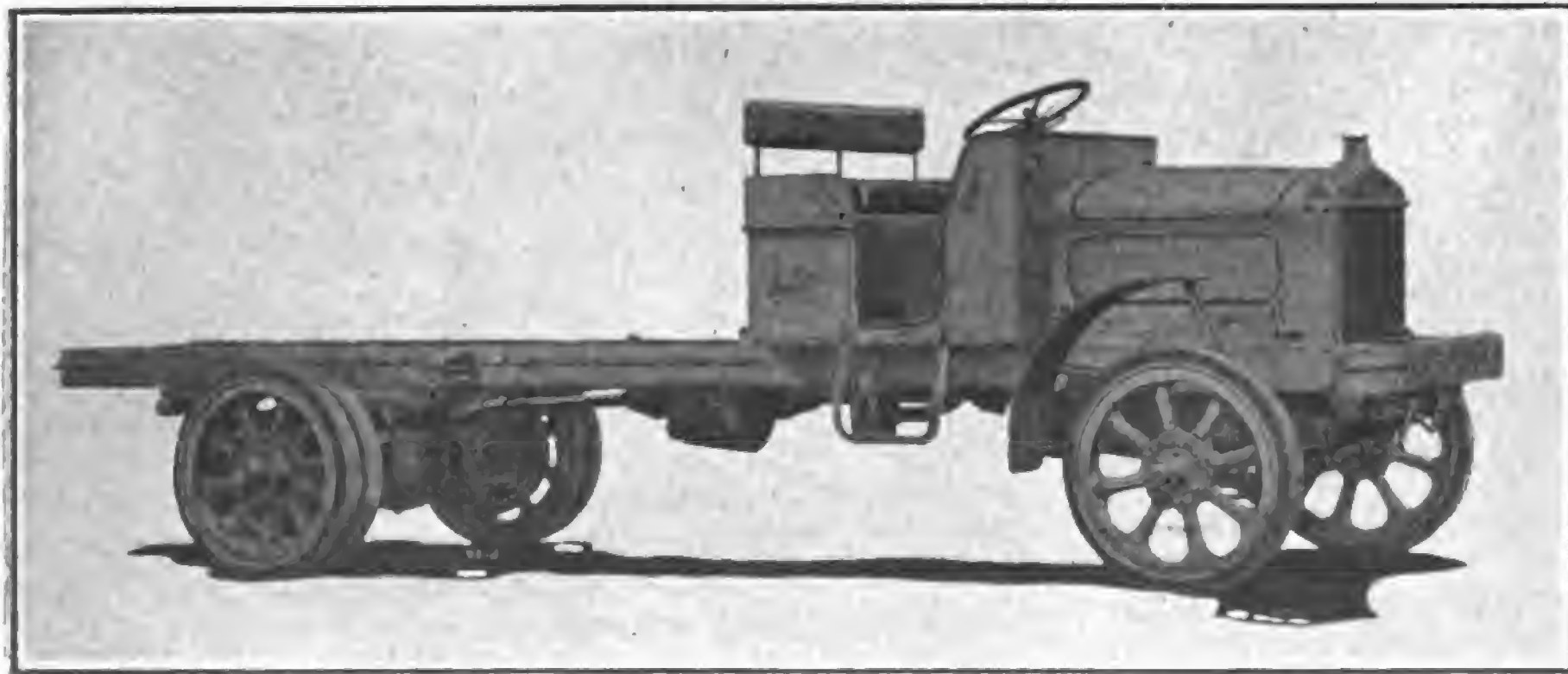
Lubrication of the engine is by force feed, the oil being delivered by a large sized gear pump direct to the crankshaft and connecting rod bearings. Leads also communicate with the camshaft bearings. The piston pin bearing is not oiled from the pressure system, but receives its lubrication from the oil mist thrown off by the connecting rod bearings. A pressure relief holds the oil pressure to approximately 15 pounds, the excess oil from the system being delivered to the timing gearset. The oil is passed through a strainer before returning to the oil pump. This strainer is easily removed for cleaning without disturbing the oil pump or removing any of the engine parts.

The clutch is of the multiple dry disc type, employing eight pairs of driving plates.

The clutch driving discs are formed similar to a gear, the drive being taken from the teeth. The clutch bearings and throwout bearings are of a ball type, the clutch being in unit with the engine and enclosed in the flywheel.

Four-Speed Gearset.

The transmission gearset is a four-speed, selective sliding gear type, mounted in unit with the jackshaft. The shifting mechanism is located in the cover on top of the transmission gearset, with straight connections to the control quadrant. The main shaft, countershaft, differential and jackshafts are mounted on annular ball bearings, the jackshaft housing being an integral part of the transmission case. This unit is exceptionally rigid construction, designed to give maximum strength with least amount of weight possible. The transmission is of the indirect type, the drive being through one pair of spur gears.



New Garford Five-Ton Worm Drive Model, Which Attracted Favorable Attention During Chicago Show.

The gears are of ample width, having faces $1\frac{1}{2}$ and $1\frac{3}{4}$ inches respectively, of nickel steel construction.

The differential is of the three-pinion bevel type. The conventional spider construction is not employed for this heavy work. The main bevel set is three pitch.

The jackshafts, two inches in diameter, are splined into the differential and are tapered to receive the sprockets at the outer ends.

Final Drive Through Sprockets and Chains.

From the jackshaft to the rear axle the drive is by double side chains. The chains are two-pitch standard construction, cotton pin type. Links may be added at any point without the use of rivets. Several sprocket combinations are available, the standard 13 and 43 with options, on 11, 12 and 15 teeth jackshaft sprockets. The radius rods are the concentric type of heavy "A" shape pattern, adjustable for taking up the chain slack. The front axle is a Timken fitted with Timken tapered rollers on the wheel spindles and spindle bolt bearings. The rear axle is a special Garford construction dead axle type, fitted with tapered roller bearings in wheel hubs, and is of unusual size for the load carried. The spindle for the rear bearings is four inches and the length of the axle stub is $2\frac{1}{2}$ inches in diameter by $4\frac{1}{2}$ inches long.

The brakes consist of a service brake mounted on the transmission gearset shaft, 10 inches in diameter and four inches wide, of the contracting shoe type, and the rear wheel brakes are operated from the emergency hand lever, the brakes being 20 inches in diameter by four inches wide and are of the equalized expanding shoe type.

Chassis of Rugged Construction.

The steering mechanism is of the screw and nut type, the steering gear being mounted on the left side of the chassis and the steering wheel is 22 inches in diameter. The spark and throttle control are mounted on a quadrant under the wheel and a foot accelerator is provided in a conventional location on the floor boards, with the gearshift and emergency brake lever mounted in center of chassis at the driver's right.

The springs are semi-elliptic front and rear, the front spring being 42 inches long and three inches wide, while the rear spring is 50 inches long and four inches wide. An auxiliary jack spring is provided, mounted on a cross member directly over the rear axle. This spring ordinarily comes into service shortly before the full capacity load of the truck is reached, and is a great relief to the regular springs if overloads are carried.

The frame is of heavy construction, hot riveted throughout and reinforced with six heavy cross members. The frame section is eight by $2\frac{3}{4}$ inches, $5\frac{1}{16}$ inches thick.

The equipment includes cab, driver's seat, with cushions, hubodometer, three oil lights, oil can, tools, jack, etc. The instrument panel on which the oil gauge

and similar units are mounted is located in the dash in a conventional position.

The tires front are 36 by six-inch single solids, and rear 40 by seven inch dual solids. The speed of the truck engine is governed to 11 miles per hour.

Cooling of the engine is accomplished by the use of a power driven water pump fitted to the engine, a large fan driven from the engine by a flat belt and a cast tank tubular cored radiator mounted at the front end of truck frame in front of the engine. The radiator and cooling system sub-ordinarily large water capacity and is aimed to thoroughly cool the engine under all conditions of work.

TRUCKS IN CONTRACT HAULING.

"Contract Hauling with White Trucks" is a new publication by the White Co. Cleveland, O., which shows how the modern power vehicle is taking over a large share of the short haul work formerly done by the railroads. Facts are presented relating to the operations of large fleets in inter-city hauling, with figures showing the economy and results the efficiency of this medium of transportation. The publication is illustrated. It may be had upon application.

Among other things, such a booklet, by citing the experiences of numerous owners with their trucks, conveys some idea of the variety of ways in which, as well as the extent to which, motor trucks are now earning a livelihood for their owners, independent of other sources of income.

AMERICAN-LA FRANCE PROFITS.

Net profits of the American-La France Fire Engine Co. for 1920 were \$597,073, after allowances for Federal taxes. This, after payment of preferred dividends, is \$2.15 per share on the capital stock of \$10 par value outstanding. In 1919 the company earned \$23.15 per share on the capital stock of \$100, equal to \$2.31 on the \$10 stock.

The good roads bill failed of passage at the session of Congress just ended.

RECORD SHIPMENT BY SOUTHERN MOTORS INTO MEXICO.

One of the largest, if not the largest, shipments of passenger cars, motor trucks, tractors and trailers ever sent into Mexico left the plant of Southern Motors Manufacturing Association, Ltd., Houston, Tex., Saturday, Feb. 18, bound for the City of Mexico. The distributor in that city asked that the complete order be shipped at the one time, and Southern Motors complied with the request by sending through the complete shipment by special train. This was the first large shipment from the modern automotive plant which has arisen on what was about three years ago a large cattle ranch. The factory from which was shipped 25 carloads of passenger cars, trucks, trailers and tractors, started production on a large scale but a short time ago.

DES MOINES' TRUCK DISPLAYS.

The Des Moines Truck Dealers' Association assisted in arranging many individual displays in the show rooms of the various dealers during the automobile show at the Coliseum, March 2-10, from which trucks were barred through lack of space. Trucks carried dealers and visitors between the Coliseum and the display rooms. The truck business in Des Moines had already taken a decided upward trend and the show was counted on to put it almost on a normal plane.

GASOLINE PRICE CUT.

The Standard Oil Co. of New York announced on March 9 a reduction in the selling price of kerosene and motor gasoline of one cent per gallon, effective throughout New England.

"The reduction," said an official of the company, "will become operative in Maine, New Hampshire, Massachusetts, Vermont, Connecticut and Rhode Island. Outside of that territory I have no authority to make any announcement, as the matter will be handled by others."



The New Garford $7\frac{1}{2}$ -Ton Chain Drive Model, Designed for Hauling of Heavy Loads as Daily Occupation.

BULLET PROOF ARMORED TRUCKS COMMON

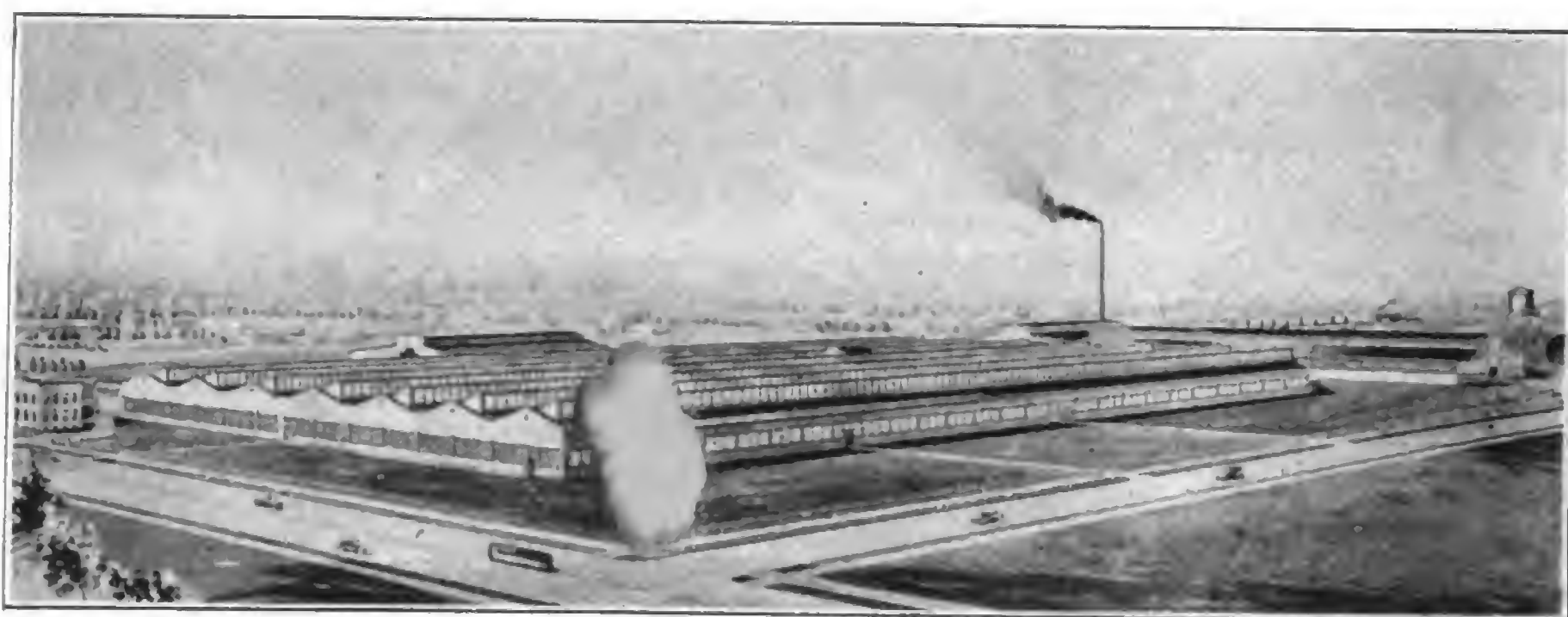
Bullet proof armored motor trucks are rapidly becoming common sights on city streets. To provide safety and service in the transfer of pay rolls and money banks, public utilities and other concerns of size are getting them in increasing numbers. They reduce the number of guards and operate as insurance for the property they protect.

The White Co. of Cleveland, O., has been specializing in jobs of this type. Two White trucks, with armored bodies, transfer thousands of dollars daily for two big banks in downtown New York. One truck — a two-ton unit — carries a body of quarter inch steel. In addition to the driver, two guards generally man the truck on its trips. The guards, heavily armed, ride on the inside. The keys to the only door (in the side of the body) are held in the branch banks or in the possession of the guards riding inside the truck. In no case can the driver open the door. In event of the truck being fired upon the steel walls of the body are of sufficient strength to flatten ordinary lead bullets, while from their protected position in the interior of the "fortress," the guards can return the fire of bandits through "portholes" arranged for such an emergency.

Day and night the "auto bank" owned by the Quaker City Cab Co. of Philadelphia answers calls. Its chief responsibility is the safe collection of funds from theaters, tradesmen, fraternal orders, building and loan companies and other organizations which customarily receive large sums of money after the closing hours of banks.

Automatic Steel Windows.

The body of the "auto bank" is of bullet proof steel. Should the truck be attacked the cashier could, merely by touching a button, drop steel curtains over all windows. The windows are further protected by steel bars. The door has a double combination lock. Tampering with locks on either door or windows would set in operation a standard burglar alarm system, connected with a large gong in the roof of the truck. If acci-



The New Columbus Plant of the Timken Roller Bearing Co. at Columbus, O., with the Main Bearing Factory in the Foreground. The Heat Treating Plant is in the Rear to the Right and Offices and Warehouses to the Left.

dent should befall the driver, the cashier could cut off the gasoline supply and stop the truck by pressing a button inside the body.

In Chicago the surface lines carry the pay envelopes of their thousands of employees to car barns and other widely scattered pay-off places in a White truck, all windows in which are protected by iron bars and an alarm system. The Cincinnati (O.) Traction Co. also depends upon a White two-ton truck for the safe transfer of pay roll money to outlying car barns.

In the collection of money from its many telephone pay stations, the Bell Telephone Co. of Philadelphia uses an armored truck. Other users of armored White trucks are the Federal Reserve banks at Boston, Chicago and Cleveland, the Cleveland Trust Co., the Citizens Savings and Trust Co. and the Garfield Savings Bank Co. in Cleveland, the First National bank and the National Shawmut bank in Boston.

CONTINENTAL ACTIVE.

Following direct orders from truck manufacturing concerns the Muskegon, Mich., plant of the Continental Motors Corporation, which builds truck engines, has resumed operations and is steadily going along toward full production.



White Truck Used by the Federal Reserve Bank of Cleveland to Protect Valuable Cargoes from Depredations of Bandits.

TIMKEN ROLLER BEARING CO.'S NEW PLANT ONE OF INDUSTRY'S BEST

The Timken Roller Bearing Co., one of the largest and most consistent contributors to the growth of the automotive industry, with main offices and main plant at Canton, O., and with direct operating and selling factories in Birmingham, England, and Paris, France, found it necessary late in 1919 to enlarge its facilities to handle the bearing business of automobile, truck and tractor industries.

With its two sources of supply in this country at Canton and Columbus and its two European factories there is adequate capacity to build bearings for the entire combined industries.

The new Columbus plant of the company is an example of up-to-date workmanship and design. An immense main building of the improved saw tooth type is 400 feet wide by 480 feet long, consisting of 10 bays each 40 feet wide. The heat treating building, an example of properly coordinated facilities of the newest equipment known to the metallurgist, is 80 by 480 feet.

These two buildings and their equipment provide capacity to furnish approximately 30,000 complete Timken tapered roller bearings daily and represent an investment of well over \$2,000,000. More than 2400 men are employed at the Columbus plant. A steady influx of orders indicate that this factory will be kept humming to supply the demand.

INTERNATIONAL MOTOR SALES.

Preliminary figures of the International Motor Truck Corporation show sales of 7025 trucks and \$35,000,000 gross revenue in 1920, including the parts and service departments. These figures compare with actual sales of 4604 trucks and gross revenues of \$22,123,951 in 1919.

STOUGHTON PLANT BUSY.

As a result of a sales stimulus, started at the shows, the Stoughton Wagon Co., Stoughton, Wis., is almost at full capacity in its motor truck division.

AUTOCAR HEAVY DUTY ROTARY DUMP BODY

THE Autocar Co., Ardmore, Pa., recently started production of a special heavy duty rotary dump body for use with their new heavy duty Autocar chassis type XXVI-Y, the wheelbase of the chassis being 120 inches. The body, which is of steel construction, fitted with flare sides and automatic end gate, is only 60 inches from the ground to top of flare boards, a very convenient height when loading from the ground. The body is built along conventional lines and differs from the usual run of dumping bodies in the method employed to operate the hoist, which has been worked out successfully by Autocar engineers and has proved exceptionally successful in the hands of users, as borne out by the many flattering testimonials received by the company.

A statement from the Rock Hill Quarry Co. of West Manayunk, Pa., which produces from its quarries building stone and trap rock, which it delivers direct to building jobs over a wide area, covering all parts of the city of Philadelphia and a 20-mile radius in the suburbs, proves interesting, as this haulage problem was complicated by the fact that, while the quarry pit is not unusually deep, it is separated from the highway by about a quarter of a mile of land that is most always moist, making it exceedingly difficult for the company to get the stone from the quarry to the highway.

The problem was finally solved by putting on the job a Heavy-Duty Autocar dump equipment, which demonstrated its capacity to haul out of the pit and across the moist road without difficulty, and also to carry loads through the most congested districts and dump them at the exact spot desired by the building contractor. It is possible for this Heavy-Duty Autocar, with its wheelbase of only 120 inches, to run onto an elevator, if necessary and carry its load of building stone to the upper floors of large buildings under construction.

The Heavy-Duty Autocar is loaded by hand in the quarry pit where the building stone is taken out, but loads of crushed trap rock are taken on from a hopper. Andrew R. Wilson, vice president of the Rock Hill Quarry Co., was so much pleased with the ability and economy of his Heavy-Duty Autocar that he recently ordered two more with the same low side rotary dump equipment.

Operating Principle Autocar Heavy Duty Rotary Dump.

The dump body is operated by means of power taken from the transmission gearset power take-off through a worm drive; the control being of a ball end hand lever mounted on the left hand side of the chassis. When in neutral position this ball end hand lever is held by a spring clip.

The ball end lever is connected by means of the gearshift connecting rod to the control cross shaft, which in turn, through suitable linkage, operates the power hoist sliding gear in the transmis-

sion case at the power take-off. This gear meshes with the power hoist idler gear and with the gearset driving gear, in this manner transmitting power from the gearset power take-off to the power hoist driving gear shaft, which is connected by universal joint to the power hoist universal drive shaft.

The lifting mechanism is carried on a steel sub-frame consisting of two side rails and two channel irons rear and front. The power hoist gearset is carried between the front and rear channels of the sub-frame.

The Worm Gear Mechanism.

The power hoist universal drive shaft is connected by means of a universal joint to the worm shaft, having a worm keyed to the shaft. The worm drives the worm ring gear, while the worm and worm ring gear are carried in the worm gear case. The worm ring gear shaft and pinion are integral and has also the worm ring gear mounted on the shaft. The pinion meshes with the intermediate shaft gear, which is carried on the intermediate shaft and which also has the crankshaft gear mounted on it. The intermediate shaft is splined, doing away with keys for holding the gears securely to the shaft. The crankshaft drive gear meshes with a large ring gear bolted to the ring gear hub, which is carried on the crankshaft. The ends of this shaft are splined and the body lifting cranks fit over the ends.

The body lifting crank and the body lifting link are connected by means of a body lifting crank pin. The body lifting link is hinged to the body angle sills by means of a body lifting link bracket and a body lifting link pin. When power is applied the body lifting crank is made to describe a clockwise circle; and when the body lifting crank and the body lifting link are straightened out fully the body has attained an angle of 40 degrees.

The body lifting link bracket is fitted with a bushing, this bushing having a

diameter about 3/16 inch larger than the body lifting link pin for the purpose of allowing the body lifting link to travel past dead center without any hard impact when the body touches the frame on the downward motion, and also to prevent a jarring pull when the body is about to start on the upward motion.

The rear end of the body is hinged to the chassis frame by means of two brackets which rest on the chassis frame and which are bolted to the angle sills on the body. The body hinge bracket shaft is carried in these two brackets. The tailgate of the body is automatically tripped by two latches striking on the rear cross member of the chassis frame.

KRUSPE MIDWEST MANAGER FOR ACASON MOTOR TRUCK CO.

Vice President Dan Gilkey, in charge of sales of the Acason Motor Truck Co., Detroit, announces the appointment of Edward W. Kruspe as mid-west manager for sales of Acason trucks, with headquarters at Chicago. Mr. Kruspe resigns from the Standard Motor Truck Co. to handle his new territory, which will include the states of Illinois, Indiana, Kentucky, Wisconsin, Iowa and Missouri. Mr. Kruspe has an enviable record in the truck selling field, having sold Four Wheel Drive Trucks, as well as Standards. His territory has been from coast to coast.

In addition to knowing the business from the factory viewpoint, Mr. Kruspe comes to Acason equipped with actual retail selling knowledge. He was for a time in the retail business at Milwaukee.

CLYDESDALE SERVICE IN N. Y.

The Clydesdale Motor Truck Co., New York city, has opened a factory branch. The service station is at 600 East 20th street, with G. B. Godfrey in charge.



Heavy Duty Autocar, Type XXVI-Y, Equipped with Power Hoist Dump Body.

REPUBLIC MODEL 10 1-TON EXPRESS

The Republic Motor Truck Co., Inc., of Alma, Mich., announces its new Model 10 Express, a one-ton pneumatic tired job. This model is of exceptional proportions and particularly attractive in appearance. The new model is not of passenger car derivation, but is constructed of proven truck units to meet the demand for a delivery truck of heavier construction and greater sturdiness than the average truck of its capacity, still possessing ample speed for city use and urban service.

The Republic Model 10 Express is equipped with a Continental Red Seal engine having a bore of $3\frac{3}{4}$ inches and stroke of five inches, and developing 22.5 horsepower according to the N. A. C. C. rating.

Standard engine equipment includes a Delco electric lighting system, which is supplied by a Delco generator driving from the timing gearset case and a storage battery located in the car.

A Delco starting motor may be supplied at the option of the purchaser, but is considered as extra equipment, this equipment being supplied at nominal additional cost.

Ignition for the engine is obtained from a Bosch high-tension magneto, which is entirely independent from the lighting system of the truck.

The transmission is provided with an unusually low gear ratio in low speed, assuring ample power for starting loads under adverse conditions. The transmission is of the three-speed selective sliding gear type in unit with the engine. Final drive is through the famous Republic-Torbensen internal gear driven axle to the rear wheel drums and the wheels, the gear reduction in the axle being designed so that maximum truck speed is obtained without racing the engine.

The wheels are equipped with extra large pneumatic cord tires 35 by five inches in size and interchangeable front and rear. These tires are heavy truck type, their extra size assuring not only

maximum tire mileage, but ability to safely carry full capacity loads under all conditions. Using the same size tire front and rear simplifies the matter of carrying extra tires, as only one extra tire and rim are necessary.

The Express model is furnished with two styles of express body, either open or canopy top, an extra tire carrier and rim being included with both styles. The truck is also fitted with full length running boards, connecting front and rear crown fenders. Complete curtain equipment is furnished with the enclosed cab and with the canopy top express body. The cab also includes a two-piece adjustable windshield and is fitted with removable side curtains which open with the doors.

TRUCKS TO ASSIST RAILROADS IN STORE DOOR DELIVER- IES AND COLLECTIONS

The transportation committee of the Federal Highway Council has put before railway traffic executives in eastern territory the proposal that a larger use be made of the highway and motor truck in the store door collection and delivery of freight.

In determining the class of traffic which would economically come under the new plan of delivery, J. C. Lincoln, traffic manager of the merchants' Association of New York, has had embodied in the plan of procedure the principle that store door delivery should apply to all station or platform delivery. This would exclude carload lots delivered to sidings, but would include carload lots handled over the freight platforms at terminals. In most smaller cities carload lots are seldom handled over platforms, while at New York city a large portion of the freight is so handled whether it is carload or less than carload lot.

A motion has also been adopted to the effect that "the committee deems it most

advantageous to have store door delivery a carrier service, but at additional rates not included in the through rates." It was brought out in the discussion that store door delivery tariffs should be published separately, similar to the lighter-age tariffs of New York.

Discussion at the last conference thoroughly established the fact that this proposed service should not be an additional burden upon the railroads.

Upon the suggestion of William J. Pitt of Philadelphia the committee has adopted a recommendation that "the carriers, to avoid congestion and delay, be urged to establish and operate, in all large cities, a store door collection and delivery system to be performed by, or under the control of the carrier, the carrier to assume liability for the safe transfer by their representatives, a reasonable charge to be assessed for such service."

The committee entrusted with the task of presenting the plan to the railroads is composed of A. E. Beck, general traffic manager, Merchants' & Manufacturers' Association, Baltimore, Md.; J. C. Lincoln, general traffic manager, Merchants' Association, New York; Wm. J. Pitt, general traffic manager, John Lucas & Co., Philadelphia, Pa., and who is also chairman of the traffic committee's Paint Manufacturers' Association of the United States; National Varnish Manufacturers' Association and Philadelphia Paint, Oil and Varnish club, and T. T. Harkrader, general traffic manager, American Tobacco Co., New York; W. J. L. Banham, general traffic manager of the Otis Elevator Co., New York, and Dr. R. S. MacElwee, director, Bureau of Foreign and Domestic Commerce, Washington, D. C.

HERCULES DISTRIBUTION.

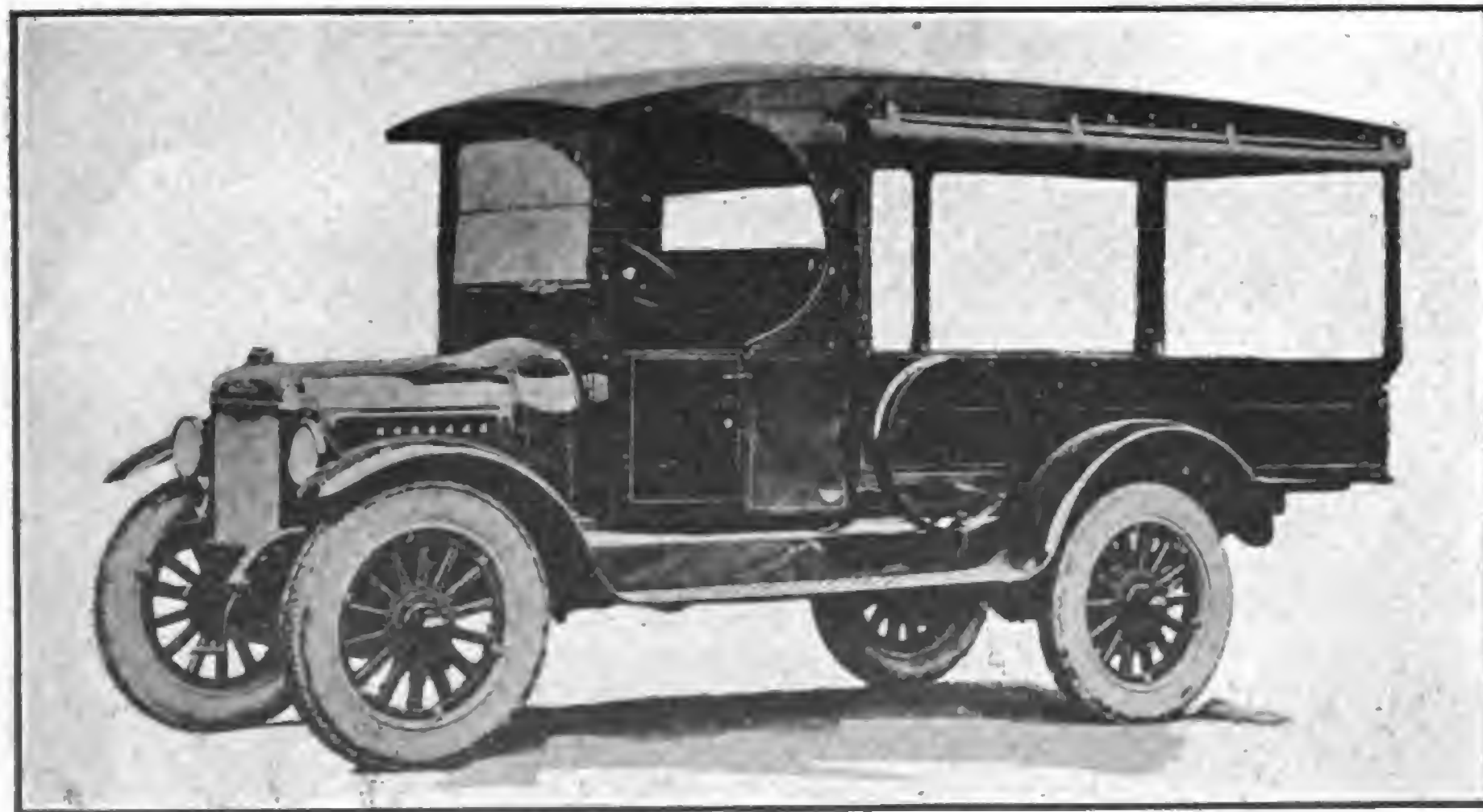
The Hercules Corporation, Evansville, Ind., has made arrangement to carry a complete stock of Hercules bodies in all of the principal cities and especially those wherein Ford has an assembling plant, so in the future Ford dealers will be able to secure Hercules bodies and driveouts from these cities.

The company has been constantly improving its various styles and now has one of the most attractive line of business bodies manufactured in the United States. It exhibited at the New York Highway Transportation Show in January and received many complimentary comments on the sturdy construction of its various types of bodies.

TROY TRAILER CHANGES.

The Troy Wagon Works Co., Troy, O., has appointed W. J. Murray as general manager and H. H. Tamplin secretary-treasurer. Both are well known in the industry.

There was a fine showing of trucks at the recent Portland, Me., show.



New Republic One-Ton Model for Delivery Work, Which Has Both Speed and Hauling Capacity.

NEW BROCKWAY HIGHWAY EXPRESS

THE Brockway Motor Truck Co., Cortland, N. Y., believes that it has successfully solved the problem of a moderate priced, all-purpose truck of the right size and weight, capable of transporting its loads speedily and economically and surmounting difficulties incident to constant service over city streets and rough country roads.

This new truck, popularly known as the Highway Express, is given the model letter "E." It is of three-quarter ton capacity, with a safe margin of overload and is constructed throughout of standard units. The model "E" recently introduced completes the line of Brockway trucks, the tonnage capacities being as follows: $\frac{3}{4}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$ and five tons, and providing a sales line which is suitable for all classes of industry.

Power Plant Monobloc Enclosed Type.

The power plant consists of a four-cylinder, four-stroke cycle, L-head engine, having a bore of $3\frac{3}{4}$ inches and stroke of $5\frac{1}{2}$ inches, developing under S. A. E. rating 22.5 horsepower. The carburetor is an automatic float feed type and ignition is obtained from a storage battery which is kept in a charged condition by means of a power driven generator driven from the timing gearset of the engine. The starting and lighting system is of the two-unit type, with the starting motor meshing with a ring gear on the flywheel.

Cooling is accomplished by a vertical finned tube radiator, the core being surrounded by a pressed steel case, while a large fan at the rear of the radiator, driven by belt from a pulley on the engine timing gearset, drives the fan at sufficient speed to cool the water in the radiator as it flows from the top to the bottom. The water is circulated by a centrifugal water pump attached to the side of the engine and driven from a gear in the timing gearset by a shaft connected to the pump. Large water jackets surround the engine cylinders and valves, providing sufficient cooling area to keep the engine at a proper working temperature regardless of speed or climatic conditions.

Gearset a Unit with Engine.

The clutch, which is a multiple dry disc type, is enclosed in the flywheel housing, together with the transmission gearset, and is easily reached for adjustment by removing a cover in the top of the bell housing. The gearset is selective type, having three speeds forward and one reverse. Counter and main shafts operate on anti-friction bearings, while the gears, which are of alloy steel, heat treated and hardened, have unusually wide faces and deep cut teeth. The propeller shaft is of tubular steel, providing great strength, and is fitted at each end with dust-proof, oil-tight universal joints. A center bearing is provided, which consists of a self-aligning bearing of S. K. F. manufacture, which is supported from the frame member, preventing whipping of the shaft, some-

times found in propeller shafts of one-piece construction.

The final drive is through helical cut bevel gears and differential to three-quarter floating keyed axles to the hubs of the wheels. The axle housing is of one-piece construction, amply reinforced with webbing around the differential housing. The helical cut bevel gears are of alloy steel, case hardened and heat treated. The axle bearings consist of taper roller bearings fitted with cages and of ample size for the carrying capacity of the truck.

Oversize Cord Pneumatics.

The wheels are equipped with oversize truck cord pneumatics 35 by five inches front and rear, and include five demountable rims, one extra, which cares for the extra tire carried in tire holder on the side of truck.

The springs are semi-elliptic, front and rear, of ample size for the specified capacity, while the frame is made of pressed steel, exceptionally strong and well braced with cross members to withstand torsional strains due to operation over rough roads and city streets. The wheelbase of the Highway Express is 135 inches and the standard tread 56 inches.

Standard equipment includes either a driver's cab and open express body $8\frac{1}{2}$ feet long and 46 inches wide, equipped with flare boards, spare rim holder and tailboard or a body equipped with top and curtains and wide sides. Electrical equipment includes a generator, storage battery, two head, tail and dash lamps. Regular equipment consists of jack, full set of tools, spare rim and carrier, speedometer, spring bumper, front and rear fenders. Wheels are finished in red, while the cab and body are finished in dark green.

I. H. TRUCK WORKS BUSY.

The motor truck works of the International Harvester Co., at Akron, O., is rapidly increasing its production toward normal, adding to its working force weekly. An order for 500 trucks to go abroad has just been completed. The company is also to produce 6000 thresher machine engines this year.

N. Y. STATE TRUCK FEES.

A bill presented early this month in the New York Senate, will, if enacted, close the highways built and maintained by the state outside of the cities to motor trucks of more than $7\frac{1}{2}$ tons burden. It is calculated that, when fully loaded, such a truck will weigh approximately 25,000 pounds. The bill seeks by a series of technical provisions to regulate the height and width of loads and the distribution, generally of the weight per inch of tire base.

The bill specifically provides that no truck of combined weight and load exceeding 25,000 pounds will be permitted to operate on highways outside the cities.

The proposed fees, the combined weight of trucks and load and the percentage fee increases follow:

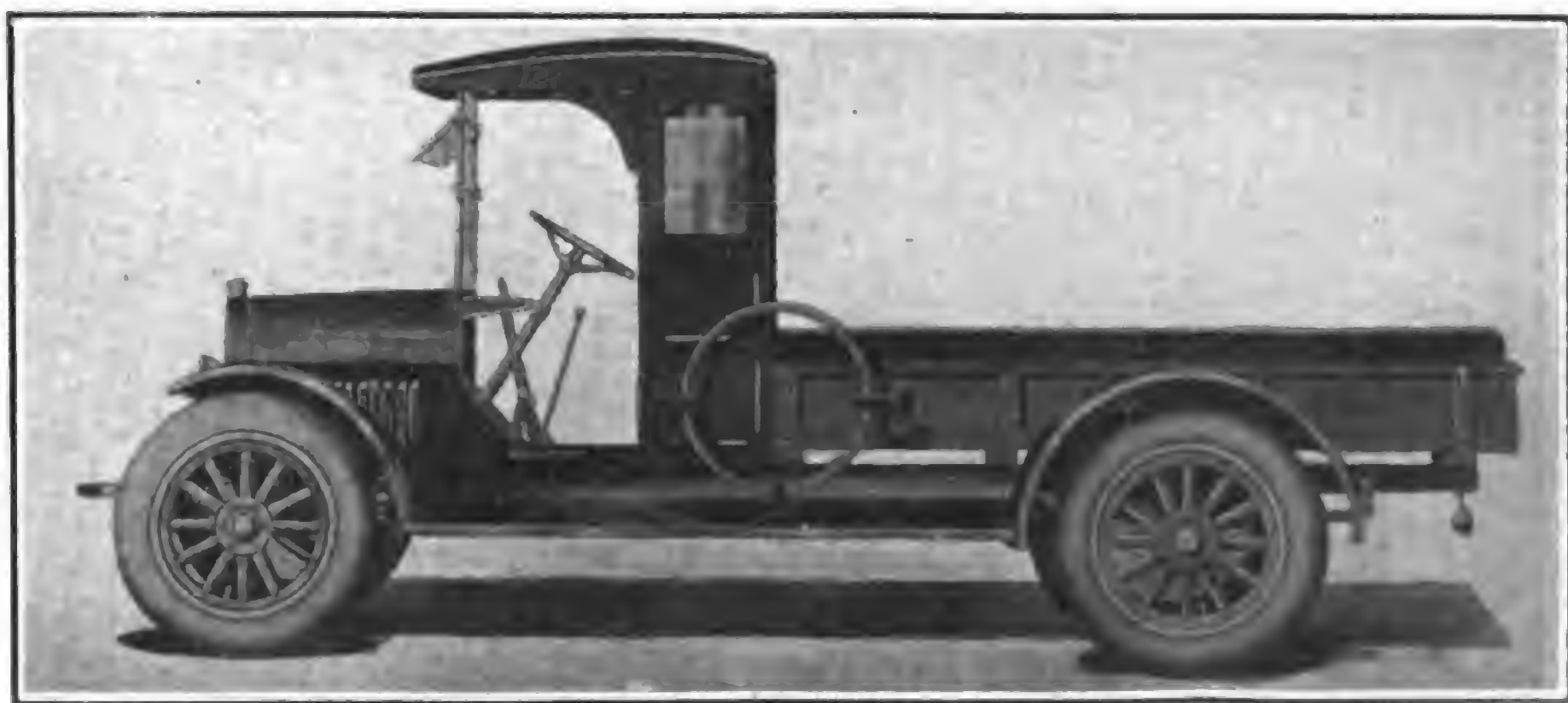
2 tons or less,	\$15.00, or 50% increase.
2-3 tons,	\$2.50, increase 100%.
4-5 tons,	\$50.00, increase 100%.
6-7 tons,	\$70.00, increase 100%.
8-9 tons,	\$90.00, increase 100%.
10-11 tons,	\$110.00, increase 100%.
11-13 tons,	\$130.00, increase 100%.
$\frac{3}{4}$ tons,	\$40.00, increase 100%.
5-6 tons,	\$60.00, increase 100%.
$\frac{7}{8}$ tons,	\$80.00, increase 100%.
9-10 tons,	\$100.00, increase 100%.
11-12 tons,	\$120.00, increase 100%.
13-14 tons,	\$140.00, increase 100%.
Trailer fees increased 50%.	

According to an estimate made by the fiscal committees of the two houses the addition of the proposed new tax would bring total motor taxes up to about \$12,000,000, of which the state would keep \$9,000,000 and distribute the rest among the localities where the tax has been collected. Last year's motor vehicle tax brought in \$8,800,000.

This year's motor tax increases, according to Senator Lowman, are merely the forerunner of further increases next year when provision will have to be made for 11,000 miles of improved highways.

HEAVY MIDWEST OFFERS.

During the 60 days up to March 1 the Midwest Engine Co., Indianapolis, Ind., received orders amounting to \$4,500,000.



The Brockway Model "E" $\frac{3}{4}$ -Ton Truck, Designed to Make Deliveries Speedily and Economically.

Truck Saves Freight Charges For Cigar Manufacturer

Economy and Efficiency of the Power Hauler Further Demonstrated in Third of Series of Articles—H. Traiser & Co., Delivers 100,000 Cigars a Day at Former Cost of Packing and Handling—Single Vehicle Also Advertises and Expands Business—Experiences of Other Concerns Cited.

The cigar industry is rapidly being sold on the utility of the motor truck. The power vehicle delivers the product of the factories the same day on which the order is placed. The cigars go directly into the hands of the dealer and the efficiency of this transportation medium is being generally recognized in the industry.

The experience of H. Traiser & Co., Boston, Mass., manufacturer of the nationally known Harvard and Pippin cigars, illustrates the benefits of motor delivery to the fullest extent. Yet this concern has but one truck a $\frac{3}{4}$ -ton Stewart which has saved the concern thousands of dollars, paid for itself many times over, expanded its business and even assisted in keeping the price of its product below rival concerns during the eight months that it has been in service.

This single truck covers a zone extending 50 miles around Boston. It travels an average of 600 miles a week and has run around 20,000 miles in its eight months of activity.

One day it shoots down to Fall River and New Bedford. The next it takes in Worcester, Fitchburg and surrounding towns. Then its wanderings bring it to Providence and Pawtucket in Rhode Island. Lowell, Lawrence and Haverhill are taken in another day. The Lynn-Salem territory is covered on a fifth

Freight and express rates for 50 miles around Boston, Mass., may soar sky-high, but H. Traiser & Co., manufacturer of the famed Harvard and Pippin cigars, worries not. In fact, the higher the rates go the more money this concern saves. Figures show that this organization is putting into its treasury daily the money formerly paid for railroad and express freight. How was it done? You've guessed it. The company went right out and bought a motor truck. This truck has delivered 20,000,000 cigars in the past eight months at the cost formerly paid for packing, packing material and handling.

day. An entire day is given to Boston deliveries and enough time is spared on other days to make a total of two days a week for deliveries in the Massachusetts capital. All this travelling is done in regular hours, except the Fall River-New Bedford run, which usually goes into

overtime.

This truck delivers 100,000 cigars a day, 2,500,000 a month and has delivered 20,000,000 in eight months.

The company figures that 100,000 cigars can be delivered by motor truck to Providence, for instance, at a cost of \$16. This sum would no more than cover the amount formerly paid for packing, labor and the cost of lumber and other materials necessary for encasing the cigars when they were shipped by railroad. Now the cigars, in boxes of 50 or 100, are simply tied together with rope.

These figures show that by the use of the truck all freight charges are wiped out.

Further, the cost of delivering to the freight house in Boston and the cost to the customer of delivering from the Providence freight house are saved.

While on the matter of economy as it affects this particular truck, it is interesting to note the difference between truck and horse and wagon delivery as exemplified in the case of this organization.

The company formerly paid \$55 a month for stabling its horse and wagon equipment and \$8 a month for shoeing. The bill for storage of the truck, gasoline and oil, for the month of December, was \$45. This was a saving of \$18 a month.

In two days or less the truck now delivers in Boston more cigars than the wagon outfit delivered in a week. The latter, of course, has been eliminated since the advent of the truck.

In other words, the company makes all outside deliveries without cost and, in addition, saves all freight charges. Its business outside has increased because of the extra satisfaction afforded customers by the quick and certain deliveries.

Business in the communities the truck serves has actually been increased more than 50 per cent. during the eight months the truck has been on the job.

Another factor is the personal appeal of direct delivery. Instead of the cigars reaching the dealer through the hands of a phlegmatic expressman, either employed by the express company or hired



The Stewart $\frac{3}{4}$ -Ton Truck Which Covers a 50-Mile Territory, Delivers 100,000 Cigars a Day and Builds Business.

by the dealer, the goods are brought to the customer's doors by a representative of the company. The personal signature of the consignee is secured and the trouble and expense of tracing shipments is done away with. There are no damages or claims now. Also, when goods are delivered payments are made promptly, particularly when a company representative in the person of the driver makes weekly calls.

What happened before the company bought its truck may be illustrated in the case of a shipment made by railroad to Pawtucket, R. I., on Jan. 6 of last year. The dealer got his cigars on March 1, more than seven weeks after they had left the factory.

The dealer probably lost trade by not being able to supply customers with their favorite brand. He also lost the profit on the sales that would have been made during that period. The manufacturer, of course, was not paid until the goods arrived. This was a big shipment, too, this dealer having a standing order for 35,000 cigars a week.

The company is particularly fortunate in the type of driver that pilots its truck. This man was in the banking line pre-

vious to the world war. His health was shattered during that conflict and he has since turned to outside work. He is a highly paid employee and is worth what he gets. He can do business with men to whom he delivers the company's product as well as any of its salesmen or representatives.

Company officials figure that the advertising secured through the running of the truck to New England points is almost worth initial cost.

People in a score of cities see this fast going, attractive looking truck speeding along their streets carrying the Harvard and Pippin sign. They are impressed with the progress indicated and have no means of knowing whether the company is operating one truck or 20. It is a more potent reminder than the printed word on newspaper or billboard.

Cost records are kept only in a general way. The officials figure there is no need of keeping them for comparisons. They speak for themselves. The saving is so apparent that the results can be carried in the head.

There is no hesitation in admitting that the truck has been abused. It is constantly loaded, never having been built to carry 100,000 cigars, as it is

nearly always asked to do. Despite this fact the only repair of a major nature has been to a broken spring. One set of tires has been worn out. For its second set of shoes Fisk cords were bought and they are as good as new after running nearly 10,000 miles.

The company is finding that it needs a larger vehicle and at an early date will get a much bigger truck. When it made its present buy the outfit was plenty big enough, which gives an inkling of how the business has piled up since the power vehicle had its inning.

The big truck to be secured can easily be bought out of the freight and express charges saved in the past eight months and the company figures that it can operate for quite a spell on the money saved through its first truck.

Fully as great as the actual having in dollars H. Traiser & Co. counts the other assets of truck delivery, the extra hauling and handling eliminated by direct delivery, the certainty of delivery, the speeding up of payments, the ability to keep the price of its product at a lower notch, the extra advertising, the expansion of business and, greatest of all, the pleased and satisfied customer.

Trucks Build Successful Business in Three Years

(By CHARLES McCARRON, Philadelphia, Pa.)

IN LESS than three years my fleet of four Selden trucks has built up a successful cartage business for me.

In December, 1917, I purchased one 3½-ton Selden truck and three more in June, 1918, for use in the general hauling business. Being equipped with dump bodies and hydraulic hoists, they are used mostly for hauling bulk materials, such as ashes, cinders, clay, sand and brick.

These trucks operate about 320 days in the year and average about 75 miles a day. One of those purchased in June, 1918, has run 55,172 miles; another, 61,821 miles. The one bought in December, 1917, has run 65,562 miles.

On their regular work around the city these trucks make seven trips a day, averaging four tons to the trip. They usually load from a chute and dump at the other end. By means of this quick loading and unloading they are able to keep on the road most of the time, and so have made a high mileage.

Four months a year we haul ashes from the Philadelphia Electric Light company plant. On this work a truck makes 14 trips a day. For two months in the spring of 1920 we hauled stones between Atlantic City and Philadelphia, a distance of 72 miles each way. In the eight weeks the trucks averaged 30 loads apiece.

The Seldens have also made a good many trips to Wilmington, 28 miles away, and to Paxton, 37 miles. They are usually running over fair roads

where the traffic is rather light and the hills are few.

In figuring our costs we allow \$742.86 per truck a year for administrative overhead. This represents the salaries of myself as street superintendent, and of the secretary of the firm, who handles the office work and does the dispatching. This charge is divided among our seven trucks.

I make it my business to be about the streets in my touring car, seeing that the trucks are doing their work and do-

ing it right. When they get stuck I help the driver get them out, and keep after the drivers generally without hounding them. I also make estimates, get the contracts and tend to the collections.

We depreciate our trucks on a minimum life of 100,000 miles. As all our Seldens have run 55,000 and 65,000 miles and are still in first class condition, we have reason to think that this estimate is conservative.

For the purpose of showing detailed costs I have chosen one of the Seldens pur-



One of the Selden Trucks Owned by Charles McCarron, Philadelphia, Pa., Which Average Around 25,000 Miles a Year.

chased June 11, 1918, which has run 56,316 miles by odometer reading up to Oct. 11, 1920. It will be understood, therefore, that while this is a typical performance record for our four Seldens, it is not an average for the four trucks.

Our repair and maintenance charges amount to about \$175 a year for each truck. Adding the salary of our repair man, which has to be divided among seven trucks, we have a total repair and maintenance cost of \$1275 for the two years and four months this truck has been in operation.

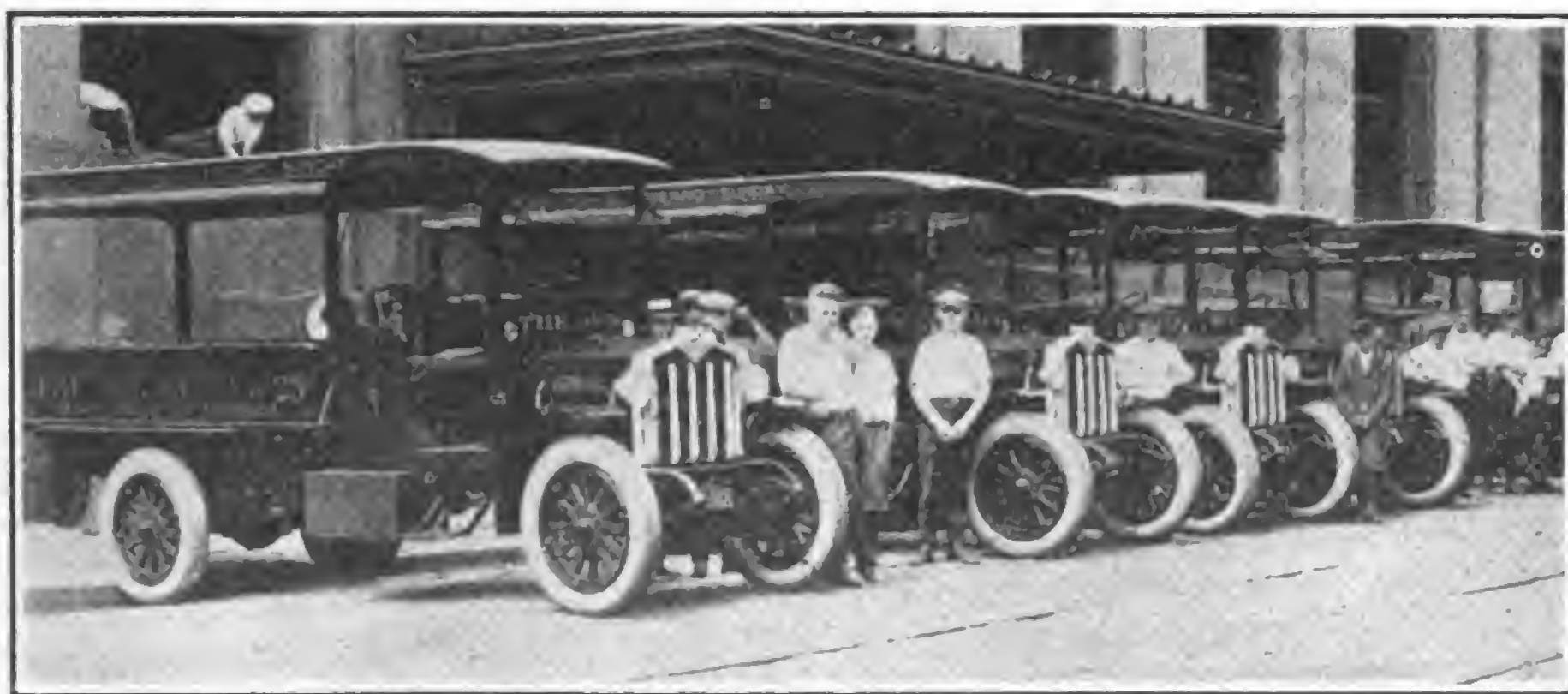
We know from various tests that we get 4.4 miles to a gallon of gasoline and use three quarts of oil a day. Our drivers' wages amount to \$30 a week; and when they are hauling ashes we pay them 50 cents additional for each load hauled overtime. We find then that this Selden truck is costing us \$22.58 per day, 29.9 cents a mile, 62.9 cents a ton and 15 cents a ton-mile.

Cutting Operating Costs.

Our low costs are due in a large measure to the way we handle our drivers and to our careful inspection and repair system. The drivers are thoroughly coached in their duties, treated well and never laid off if their trucks are laid up. Our inspection and repair system enables our mechanic to detect troubles in their early stages and stop them before they can become serious.

We make it a point to drain the crank case of every truck once a month. Having found it necessary to use good oil if an engine is going to run properly, we buy good oil and use it liberally. In loading the trucks we are careful to keep close to their capacity. Our drivers have instructions to stop the truck whenever necessary to put in oil and water and tighten up bolts. Any man who speeds is discharged.

A good many truck owners boast that their trucks will go out in a heavy snow storm and get through the snow all right; but I am willing to let the other fellow have the job, and take a chance on ruining his truck, because I have found that such business doesn't pay in the long run. Before taking any job I find out about the operating conditions, because often people will hire a truck to do work that they would not let their own truck tackle.



Fleet of Clydesdale Trucks Which Give Economical, Dependable Delivery Service for Baltimore, Md., Sun.

Truck Beats Team Nine to One



Pair of Five-Ton White Trucks, Each of Which Hauls 35 Yards of Gravel to Every Four Hauled by Four-Horse Team.

Hauling gravel from the pits to points along the road is just one phase of the work performed by the five-ton White truck owned by the county of San Luis Obispo, California, and another White of like capacity operated on the same job by John Guy, hauling contractor. On this job there is a chance to define sharply the contrast between old and new in hauling equipment and methods, for struggling along with powerful motor trucks a few teams of horses are still retained. Their presence affords an unescapable opportunity to literally measure in "horsepower" the endurance and capacity for work of the motor truck.

Reduced to figures, the exact superiority of the five-ton White truck over the horse would read something like this, according to Supervisor E. C. Loomis, in charge of road work in San Luis Obispo county:

"Each truck daily made six round trips, averaging 13 miles in length, carrying between 5½ and six yards of gravel. Four horses, pulling a wagon and two yards of gravel, made two round trips a day, two teams thus transporting four yards to every 35 hauled and spread by a single motor truck.

"Besides, horses tire quickly. They also consume an enormous amount of feed. Motor trucks are tireless, require little attention and their upkeep cost is

negligible when the amount of work they accomplish is considered."

When not engaged in hauling gravel or spreading it along the road, the sturdy trucks are used in pulling road machinery or, equipped with 1500-gallon tank, in sprinkling the road.

The present method of excavating, loading, transporting and spreading gravel by motor truck is estimated to cost two-thirds less than in the days when horses were the sole equipment. Now workmen plow up the tenacious gravel and scrape it within reach of the mechanical loader installed at the side of the gravel bank. A truck can be loaded and started on its way in 10 minutes. Arrived at its destination the truck distributes its load by means of the spreader, which is part of its mechanism.

During five months of 1920, eight miles of gravel were laid in San Luis Obispo county.

TRUCKS SAVE MONEY AND TIME IN DELIVERING PAPERS.

Newspapers demand efficiency from all who serve them, whether human or otherwise. In these days of the high cost of paper they are also paring expenses to the bone and operating with only what is economical. The Baltimore Sun, Baltimore, Md., is a newspaper of wide standing, with which efficiency is an accepted standard.

This publishing concern has thousands of papers to deliver in Baltimore. Deliveries are made daily and the Sun prides itself on getting the paper to its readers on time. It has found that its fleet of Clydesdale one-ton trucks answers all the exacting demands of its business.

When the press doesn't break down the Baltimore dealers know just when to look for their papers. Being on time at the dealers' means being on time with the reader. The Sun counts dependability as one of its strongest assets and has never had its reputation in this regard shattered through the use of Clydesdale trucks, which have been on the job as faithfully and as surely as any machinery operated by the concern.

Truck Pays For Itself in Six Months Hauling Logs

The Roberson, Strader Co., Greensboro, N. C., manufacturers of lumber and pine box shooks, were paying \$4 per 1000 for hauling logs from the woods 7½ miles away to their mill at Greensboro.

The Sutton-Middleton Auto Co., Acme truck distributors and dealers at Greensboro, convinced the Roberson, Strader folks that delivery costs could be greatly reduced by the motor truck method of hauling. The lumber people were not entirely convinced, but did purchase one two-ton Acme truck in March, 1919, to prove to themselves whether the motor truck method was more economical than horses. After operating this truck 11 months over all kinds of roads, hauling logs and lumber, without any expense whatever for repairs or loss of time on account of mechanical trouble, it was an easy matter to sell the second truck, which was purchased early in 1920.

In a letter dated Feb. 16, 1920, Z. V. Strader of the Roberson, Strader Co. said: "Before deciding to purchase trucks and do our own hauling we were paying \$4 a thousand for hauling lumber. We have kept careful records on our first Acme and find that the cost per thousand has been only \$1.02, this including cost of driver, gas, oil and so

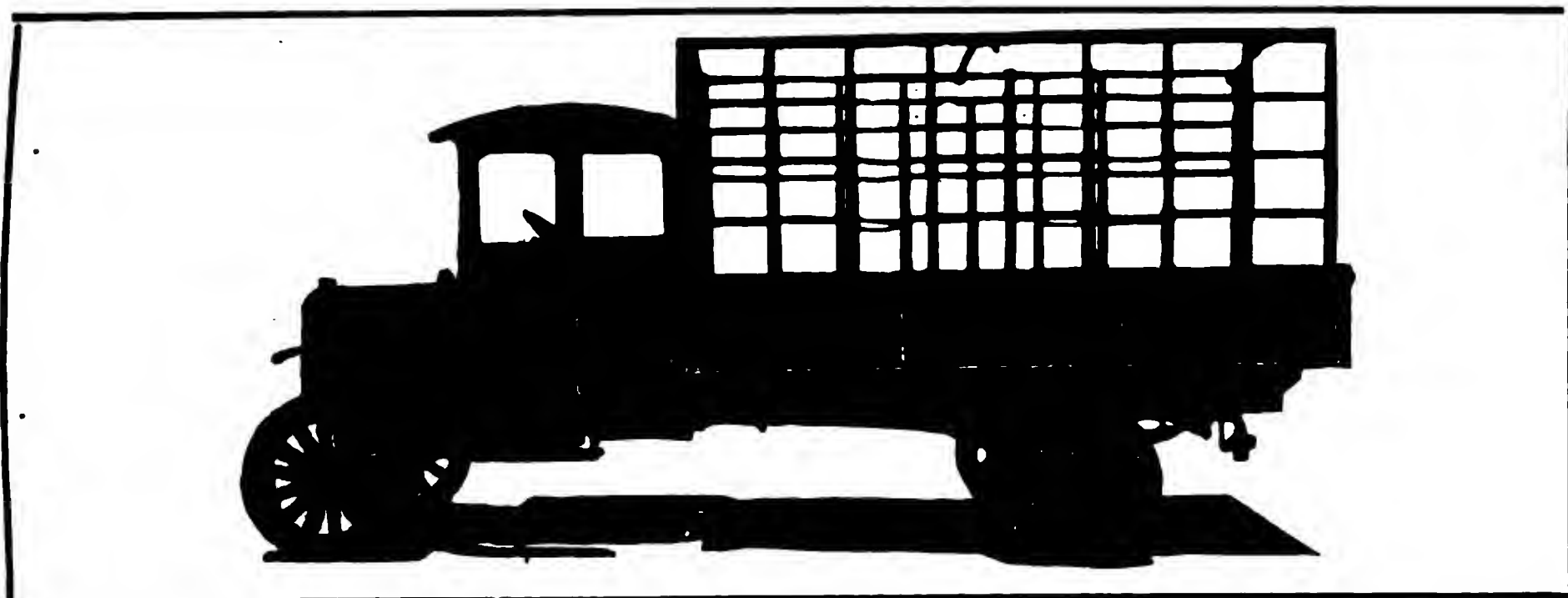


Pair of Two-Ton Acme Trucks Which Save Money for Big Lumber Concern at Greensboro, N. C.

forth, but not making any allowance for investment. However, as our records show that the truck paid for itself the first six months, we have no further doubt as to the wisdom of our investment in Acme trucks."

The accompanying photograph shows the two-ton Acme truck owned by Rob-

erson, Strader Co. hauling logs from the woods 7½ miles distant to the mills. Each load of logs has between 5000 and 7000 feet of lumber, weighing about 5200 pounds to the load. Truck makes five trips daily and each truck averages enough logs to cut out about 3000 feet of lumber.



Day-Elder Truck Which Operates Without Visiting Repair Shops.

NO REPAIRS IN FIVE MONTHS.

Carrying 1,106,000 pounds over 2708 miles during a period of five months without the expenditure of a penny for repairs is the record of the Day-Elder 2½-ton motor truck, shown in the accompanying cut. The gasoline cost during this period was at the rate of 6½ cents per mile.

This truck, which is the product of the Day-Elders Motor Corporation, is in the service of Charles Hollenbach, manufacturer of summer sausage, 1313 S. Oakley avenue, Chicago, Ill., who furnishes the above data.

REHANDLING SAVED.

"One of the finest examples of the advantages of ship by truck is afforded by H. Hughes Moving Co.'s Transport truck, which for some time ran regularly between Lansing and Detroit," says the Lansing Transport distributor at Lansing, Mich.

"The truck is the model 50 Transport of 5000 pounds capacity. It regularly

made the round trip with a full load each way on one tankful of gas, 18 gallons. This is an average of 10 miles to the gallon. At the present price of gas you can see the big saving that is effected when you compare the Transport way with the old means of freight transportation.

"Hughes picked up his load at the place of starting and delivered it at the final point at the end of the journey. There was no loading for cartage to a freight station or unloading and reloading for shipment. Wasteful rehandling was also eliminated at the other end. One loading and unloading serves for the shipment.

"The business is extremely profitable both for Hughes people and customers."



Transport Truck Which Makes Round Trip Regularly Between Lansing and Detroit, Averaging 10 Miles to Gallon of Gasoline.

HANDING A BLACK EYE TO POOR BUSINESS

HERE'S A COMPANY THAT KNOWS NOTHING OF POOR BUSINESS

Is business poor?

The Reo Motor Car Co., Lansing, Mich., suggests the opposite in the Feb. 15 issue of its house organ, Reo Speed. Here's the story:

"Eastern distributors, who never before attended the Chicago Automobile Show, were in evidence at Reo headquarters this year. Roger Loughney of Pittsburgh, George McFarland of Harrisburg, Pa., and T. B. Quinlean, manager for A. W. Meyer of Buffalo, all placed orders for their contract specifications for January at the New York Show.

"They found buying opening up so vigorously in their territory, and so many evidences of the predicted spring rush of business, that they realized the necessity of buying while automobiles were available if they were to reap the harvest.

"So Harrisburg ordered a train load of 33 car loads of Reo passenger cars and speed wagons, Pittsburgh ordered a 50 car load train and Buffalo doubled its January orders.

"Henry Adams of Fostoria beat the show rush by telephoning in his order for 150 speed wagons for immediate drive-away the week before the New York show broke loose.

"Not to be outdone Scott Hurley of Philadelphia said he would take 25 passenger cars and 75 speed wagons if he could get them at once.

"Up in Minneapolis, L. H. Fawkes heard a rumor of what was going on and wired in his order for 150 jobs, immediate delivery.

"While way out at Vancouver, B. C., 16 eager buyers came into possession of speed wagons during the first three weeks of January.

"Meanwhile W. D. Darling at Auburn, Me., after shoveling three feet of snow off the front walk, called a meeting of his dealers, who immediately placed orders for enough cars to make them 60 per cent. over their allotment for January and February.

"And at the Milwaukee show 18 cars and speed wagons were sold at retail from the floor.

"J. M. Linscott of Boston held a dealers' meeting right after the New York show and his dealers placed orders for 212 cars. W. T. McOwen of Worcester only had about 30 on hand so he placed an order for 30 more to take care of his February and March rush.

"That new 10,000 barrel well at El Dorado, Ark., certainly started something. Little Rock has been shipping speed wagons there by the car load.

"Genial Joe Welsenbach of Utica dropped in the other day and wanted to take 18 cars back with him."

BOOST FOR FOREIGN TRADE.

The automotive industry views with confidence an early expansion of foreign trade as a result of the appointment by President Harding of Herbert Hoover as Secretary of Commerce. This is a big job and deserves a big man. Mr. Hoover's knowledge of conditions abroad and his recognized ability are factors which should be potent in developing foreign trade to the Nth power. Mr. Hoover demanded a guarantee that he would get the support of the Administration and Congress in building up the department before he would agree to accept the post.

Napoleon Motors Co. Finds No Business Depression

More than 300 stockholders were represented at the annual meeting of the stockholders of Napoleon Motors Co., Traverse City, Mich., at Traverse City, Wednesday, Feb. 2.

The board of directors elected consisted of W. G. Rath, C. D. Peet, Frank Trude, E. G. Arntz, W. J. Chase, L. W. Smith and Frank Brooker. Every member of the board, with the exception of Lawrence Smith and Frank Brooker, are residents of Traverse City. Mr. Smith is a resident of Grand Rapids and Mr. Brooker of Hart, Mich.

The duties of secretary-treasurer having become rather heavy and requiring the undivided attention of one man, Mr. Trude retired and W. G. Rath was elected to the position. Mr. Trude is actively interested in the hardware business and unable to devote his entire time to the position. Mr. Rath is succeeded as general manager by C. D. Peet, former sales manager, who also fills the position formerly held under the title for the future of sales and general manager.

The business situation of the company is very satisfactory, with current assets of more than five times current liabilities. The plant and manufacturing facilities have been greatly improved and the company will enter the spring market with a wonderful advantage over 1920. There are orders on hand which will, as the financial condition gradually changes, result in shipping orders that will keep the plant operating at full capacity. The directors announced the payment of a 10 per cent. dividend on all outstanding common stock of record Dec. 31, 1920, of which eight per cent. will be paid in stock and two per cent. in cash script payable in cash Aug. 31, 1921. The regular cash dividend is to be paid on preferred stock. Total assets of the company increased in 1920 from \$373,904.43 to \$804,998.63. This expansion of business was remarkable.

IMPROVEMENT IN TRADE COMING, SAYS DU PONT, GMC HEAD

General Motors Corporation net income for year ended Dec. 31, 1920, was \$93,500,000, from which has been deducted \$45,248,000 to cover various items, including federal taxes, inventories, write-offs, depreciation of plants, etc., which made net profits after all charges approximately \$48,252,000.

After preferred and debenture dividends of \$6,113,800, balance available for common was approximately \$42,138,200, or \$2.01 a share on 20,522,685 shares no-par common outstanding at close of year. This compares with 1919 net profits after all charges of \$60,005,484, which after preferred and debenture dividends was equal to \$36.36 a share on 1,534,100 shares of \$100 par common then outstanding.

Balance sheet as of Dec. 31, 1920, shows total current assets of \$263,839,000 and total current liabilities of \$115,544,000, making net working capital \$148,395,000.

An approximate balance sheet and statement of General Motors earnings is being sent stockholders with letter from Pierre S. du Pont, president, which says in part:

"Sales for 1920 were approximately \$565,000,000, an increase of \$56,000,000 over preceding year.

"During the year the company paid as Federal income and excess profits taxes approximately \$26,000,000. In addition, \$12,000,000 of notes issued in connection with the purchase of Fisher Body Corporation were retired and approximately \$86,000,000 was expended in extending and improving plants and facilities. The company's plants are equipped with the latest and most efficient machinery for economical manufacture, and no further important expenditures along these lines are now contemplated or appear necessary.

"Reports from distributors are encouraging and your company is in an excellent position to take advantage of and to profit by the improvement in trade which it seems reasonable to anticipate during the coming year."

BROCKWAY AT CAPACITY.

The Brockway Motor Truck Co., Cortland, N. Y., has all of its employees back, has resumed production in full and is preparing to enlarge its plant.

GOODYEAR GOING AHEAD.

The Goodyear Tire & Rubber Co., Akron, O., recently went on a five-day-a-week schedule of 60,000 tires. This compares with the peak of 33,000 tires a day in 1920.

OLD HICKORY TRUCK AT BOSTON SHOW

THE Kentucky Wagon Co., Inc., Louisville, Ky., is to exhibit its product for the first time at the Boston Show, space 231, March 12 to 19.

Old Hickory trucks are distributed throughout New England from the Old Hickory Agency, 145 Columbus avenue, Boston, Mass., and are becoming well known to the trade as a dependable truck unit, which is able to withstand unusual hard work in the commercial vehicle field, showing economy and low cost of operation that is highly satisfactory.

Old Hickory commercial vehicles have been marketed for several years and while comparatively new to New England, are well known in other parts of the country where they have been in use for some time.

The model "W," of 2500 pounds capacity which was recently placed in production, follows conventional truck design and is constructed unusually heavy for the class of work it is to perform. While it is an assembled truck, all units have been apparently chosen with the idea of building a truck that will give unusual service in the hands of owners and prove a practical investment from every point of view.

Red Seal Continental Engine.

Power is furnished from a 3½ by five-inch four-cylinder, four-cycle, L-head, vertical, Continental Red Seal model "N" engine, which develops under N. A. C. C. rating 22.5 horsepower at 1000 foot piston speed per minute. The engine, clutch and transmission gearset are a unit with the engine, supported in the frame at three points, a single point at the front, on which the engine floats, and by two arms cast integral with flywheel housing at the rear, which fastens to the side members of the frame.

The engine is equipped with the following units: Pierce governor, which regulates the speed according to the type of tires used, whether giant pneumatics or solids; Stromberg carburetor and Eisemann high-tension magneto. Lubrication of the engine is supplied by a circulating splash from a power driven oil pump in the lower crankcase reservoir. The pump is driven by helical gears from the camshaft, a screen being provided in the base which prevents the entrance of sediment into the geared oil pump.

Cooling is by means of a long vertical tube radiator composed of five sections. Four, consisting of the two sides and the upper and lower tanks, forming the shell, and the fifth, which is the core, forming the center. A water pump driven from the engine keeps the water in circulation when the engine is operating, while large water jackets cast integral with the cylinders and head of the engine, around the valve chambers and the combustion chambers, provide sufficient cooling of the water. A four-bladed fan at the rear of the radiator, driven by a belt from the engine, serves to cool the water in the radiator.

The clutch, which is enclosed in the

flywheel in unit with the engine, is a Borg & Beck 10-inch dry plate type, which is easily reached for adjustment through a hand plate on the clutch housing. The transmission gearset, which is a Grant-Lees ball bearing type, is fitted with gears and shafts of nickel steel. The faces of the gears are wide and unusually strong for the work.

Hotchkiss drive is used in this model, all pull of the rear axle being cared for through the springs. The drive from the transmission gearset is through a Blood Bros. all-metal universal joint to the tubular propeller shaft to a second all-metal universal joint, also Blood Bros., to the worm in the worm gear case. The final drive is through a worm wheel and differential to the axles. Splines on the ends of axle shafts transmit the power to the hubs of the rear wheels. All bearings in the rear axle, which is a Timken, nesting the wheels at the rear of axle.

The brakes are 16 inches in diameter, located on the rear wheel drums, the service brake contracting on the drum and the emergency brake expanding inside the drum. The front axle is of I-beam construction, with the tie rod connecting the wheels at the rear of the axle.

The steering gear is a Lavine double worm type, located on the left side of the driver's seat and connects through suitable linkage with the wheel spindle arm of the left wheel. The tie rod connects the opposite front wheel at the wheel spindle arm.

The universal joints, manufactured by Blood Bros., are of an open type, fitted with heavy cross members and hollow bolts which require filling with lubricant at intervals. The fuel tank is located under the driver's seat and has a capacity of 15 gallons, the fuel being fed to the carburetor by vacuum feed.

Control of the engine is through hand controlled spark and throttle located on the top of steering wheel and an accelerator located on the floor boards, with

the gearshift and brake lever located in the center at the operator's right hand.

The frame is a five-inch rolled channel steel construction of a semi-flexible type, amply reinforced by cross members under the load carrying unit.

The wheelbase of the model "W" Old Hickory truck is 135 inches, and the body length back of seat 10 feet. The springs are semi-elliptic front and rear, supported at the ends in heavy cast hangers at the front and heavy cast members riveted to the frame at rear.

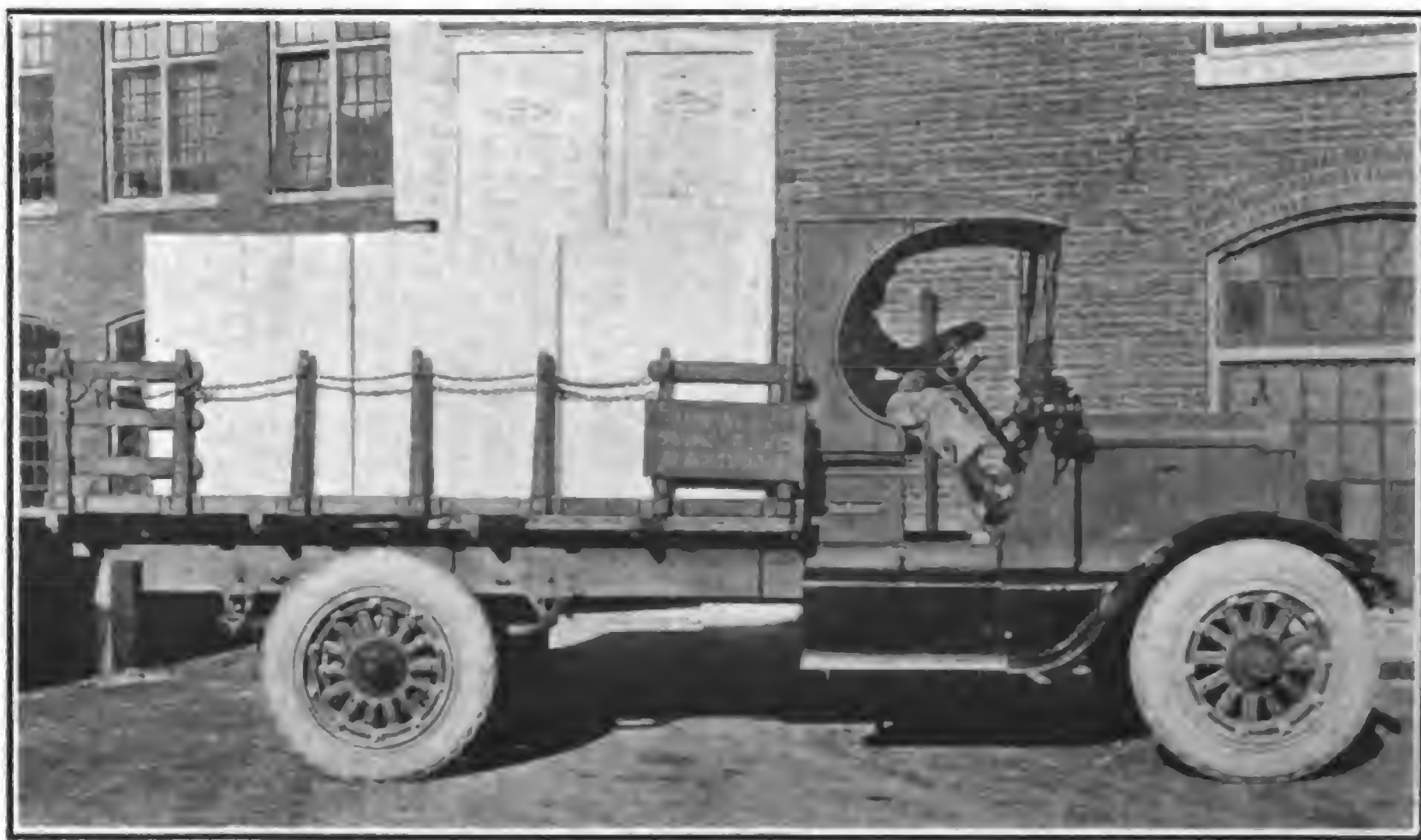
The regular equipment of tires consists of 36 by 3½-inch front and 36 by 4-inch rear when solids are used, or special equipment may be had consisting of 36 by 6-inch Giant cord pneumatics demountable type. In case of pneumatic equipment a power driven tire pump is located at the power take-off of the transmission gearset provided with a short handle, which connects the pump to the power take-off when air is wanted for tire inflation.

A heavy bumper is fitted across the front end of the truck as regular equipment which is of the same dimensions as the side member of the frame.

Regular equipment of the truck includes tools, jack, Buell horn, oil lamps, license brackets and motometer. Motor driven tire pump and gauge and extra tire carrier go with pneumatic equipment.

DRIVER GETS \$500 ESSAY PRIZE.

Thomas McGrath of New York city was presented with a check for \$500 at the meeting of the Motor Truck Association of America, Inc., at New York city, Feb. 24, this being the prize offered for the best essay on the 10 leading points of truck utility submitted during the recent Highway Transportation show conducted by that organization. Mr. McGrath based his 10 points on the operations of a Ward La France truck which he owns and drives.



The Old Hickory Model "W" 1-1¼-Ton Truck, Which Is of Unusually Heavy Construction for Its Class.

The Far East An Undeveloped Automotive Market

Millions of People Await the Lesson of Truck Utility—Busy Cities, Huge Plantations, Vast Industrial and Agricultural Enterprises Lack Modern Transportation Methods—A Field For Exploitation.

Horace Greely said "Go West."

MOTOR TRUCK says "Go East."

With business quiet at home, it is only natural that the manufacturer of today is casting longing eyes overseas.

When the domestic market "turns turtle," the industrialist must seek a foreign outlet for his products.

Europe, of course, offers unlimited working ground for the truck maker. Its capacity for absorption of power haulage equipment is beyond figures. Competition is keen. Nearly all leading manufacturers have pitched their tents on the other side and are putting in their best licks to build an enduring demand for their wares. Many are strongly established, with organizations almost as sturdy as their distributing forces in the United States.

The Far East is almost virgin soil. Taught by the war the value of the motor truck, confronted with rising labor costs, lacking anything like adequate

freight or passenger transportation facilities, little influenced by the condition of the world markets, ever growing, expanding and becoming modernized, the countries in that corner of the globe offer an unrivalled field for the installation of motor hauling vehicles.

The cost of breaking into that territory is not as great as the launching of a series of branches in Europe. In many ports of the Far East there are no customs duties on American products and, when imposed, they are not prohibitive except on commodities such as tobacco, spirits, opium, et cetera, controlled as government monopolies. Service would be required, undeniably, but the people of those districts would hardly look for the class of service demanded by the more fastidious European. Native mechanics soon become skilled and are cheap. The giving of service would mean as much to the seller as to the buyer over there, which is true anywhere, if that fact were recognized.

Think of India, with three times the population of the United States, with its tea, jute, grain and cotton plantations, just beginning to realize the benefits of motorization; Calcutta with a population of a million and a quarter, with its great jute industry and huge steel mills; Bombay, a textile city with a population of a million, and Madras, with more than half a million people. Those cities offer big markets for trucks. India imported 260 American trucks last year. This number will be doubled in 1920, there being a steady increase since the import restrictions were removed in April of last

year. The half thousand trucks going to that country this year could be multiplied many times by the right kind of effort. Approximately 20,000 pleasure cars were registered in India as of March 31, 1919, mostly of American manufacture.

Trucks in Philippines.

The Philippine Islands are fairly well motorized. In fact those islands are reported to have as many trucks proportionately as the United States. Only 516 American trucks were exported to the Philippines in 1919, however. Manila, with a population of about 275,000 people, is making ready to drive the carabao

(water buffalo), long the Filipino beast of burden off its streets. This means more trucks.

The carabao crawls along at a rate of about two miles an hour. As a result traffic is always congested on the narrow streets of busy Manila. These slow moving animals are out of place on crowded highways. The rest of the islands, which have a population of over 10,000,000, and throughout which a spirit of progress prevails, are bound to follow Manila's lead at an early date.

Figures and experience show that a truck and driver are able to get better results in a day than six carabao, six wagons and six men. The replacements necessary through the passing of the carabao would keep a truck plant busy for an extended period.

Manila is destined to be one of the biggest ports in the Orient. It is our logical distributing center for Asia. The Philippines produce sugar, hemp, tobacco, copra, coconut oil and rice in great volume. The rubber industry is growing. Plantation products must be hauled from the fields to ports of embarkation. Supplies brought in on steamships, as well as those sold in Manila, must be transported to the inland districts. There are fully 6000 miles of magnificent roads on the islands. There must be a great potential market for American trucks in this American colony.



American Trucks the One Modern Note in Armistice Celebration in the British Straits Settlements.

New York.....734 Customhouse
 Boston.....1801 Customhouse
 Chicago..1424 First National Bank Bldg.
 St. Louis..402 Third National Bank Bldg.
 New Orleans.....214 Customhouse
 San Francisco.....307 Customhouse
 Seattle.....848 Henry Bldg.

Cooperative offices are also functioning as follows:

Baltimore..Export and Import Board of Trade
 Cleveland.....Chamber of Commerce
 Chattanooga..Foreign Trade Secretary, Southern Railway System
 Cincinnati.....Chamber of Commerce
 Los Angeles.....Chamber of Commerce
 Philadelphia.....Chamber of Commerce
 Portland, Ore.....Chamber of Commerce
 Dayton....Dayton Chamber of Commerce
 Pittsburgh.....Chamber of Commerce

The Dutch East Indies.

The Dutch East Indies have about half the population of the United States and an area of nearly half a million square miles. That big country imported 324 American trucks last year and 249 during the first quarter of 1920, which shows

stituted for barley. Indo-China has excellent roads and there is no reason why trucks should not be widely used in that region.

Malaya a Big Field.

British Malaya, which includes the Straits Settlements, Federated Malay states and several native sultanates under British protection, a big producer of rubber, tin, copra and tapioca, with such cities as Singapore, 300,000, and Penang, 175,000, is rapidly recognizing the superior advantages of power haulage. The Federal, GMC, Nash and other interests are already well represented there. That territory imported 131 trucks last year and the number is going to double and triple annually, according to the efforts put into that field by American manufacturers.

In this district rubber and tin are both produced by the hundreds of thousands of tons. Copra and tapioca are other chief products. Trucks are used on the plantations, tin fields and in the cities. The motor bus has already been introduced in Singapore, Penang and the interior. The peninsula has over 4000 miles of first class highways and about

produces rice and petroleum and has a large and hustling city in Rangoon.

Roads are not good in Siam, which has a population of 8,000,000 with Bangkok as its metropolis. This city has a population of 630,000. Siam products include tin, teakwood, rubber, tobacco, rice, dried fish, cattle and hides. Even the poor highways hardly account for the fact that but four American trucks were imported in 1918 and eight in 1919. Poor roads are but a temporary handicap, as improvements in this line are being made from one end of the earth to the other. The fact that the King of Siam includes Americans among his chief advisors should help pave the pathway for American manufacturers entering that field.

U. S. Commerce Bureaus.

The MOTOR TRUCK will be glad to render all possible assistance to any truck manufacturing organization aiming for business in the Far East. The Bureau of Foreign and Domestic Commerce and its 16 district and cooperative offices have a wealth of knowledge touching on this subject, which is available to all interested. A MOTOR TRUCK represen-

Mr. George L. Logan, recently appointed by the Bureau of Foreign and Domestic Commerce as manager at Boston for the New England district, has just returned from the Far East, where he has represented the United States in various countries and capacities, during the past 12 years. He was secretary of the Philippine Commission at Manila and was in the American Consular service at Tientsin, Singapore and Penang. Besides, he has travelled extensively in the Orient, observing, studying and reporting on trade conditions problems and possibilities, and on the products and requirements of those countries. He has been the friend and co-worker of every American manufacturer entering that field and has been a power in expanding American trade in the Far East. There is none better equipped than he to present an authoritative article on the subject with which he deals in the following pages.

that its heart is in the right place. It also imported 700 American automobiles during the first three months of this year. Perhaps no land in the Far East offers a better market for American commercial and pleasure cars than this one. A mammoth road building programme for the next five years has just been inaugurated. There are great iron and tin deposits there, which are in process of development. Banca tin is known the world over for its purity. Sugar, tobacco, rubber, coffee, tea, cocoanuts, oil palm nuts and other agricultural products are raised in bulk. American interests have large rubber plantations there. Industrial enterprises are developing rapidly on modern lines. Does this not mean more trucks?

Indo-China, which comprises almost the entire French East Indies, has 17,000,000 people within its domain. That province imported 16 trucks from this nation last year against three the year before, which shows which way the wind blows. Indo-China produces rice, tapioca, copra, rubber, castor beans and oil, as well as soap, candles and rice beer. The latter is intoxicating and has all the elements of the erstwhile American beverage, with the exception that rice is sub-

stituted for barley, and both are being extended.

In Burma, which has a population of 13,000,000, there are 126 trucks mostly of American origin. These are used for nearly every purpose of hauling between the plantations and the cities. Burma

tative is in constant touch with that department and will be glad to assist in obtaining desired information for American concerns to whom the department or its branch offices may not be convenient.

The district offices are located as outlined in the first column.



View Shows That Roads in the Outlying Districts of British Malaya Put to Shame Highways in the American Rural Districts—Malaya Has 4000 Miles of Such Roads. The Tree in the Foreground Is an Unusually Large Type of the Kapok. The Pods Contain Silk Cotton Used in Automobile Upholstery.

Oriental Automotive Market Unlimited

(By GEORGE L. LOGAN, New England Manager, Bureau of Foreign and Domestic Commerce, Just Back from Extended Consular Service in Far East.)

Until recently American manufacturers and importers had a large volume of business thrust upon them, especially from the Orient, where German, Austrian and other European interests had practically controlled trade for a long time. They still have numerous friends there. We, too, have several friends and many acquaintances who will become friends in time if we treat them properly. Oriental confidence is not gained over night, but when once secured it is an enduring thing, not easily shaken nor quickly abandoned.

It was an easy task for us to develop trade in the Orient during the war and to hold it immediately thereafter. That was mere child's play. They had the price and we could deliver the goods. Indications are now that our future lot will not be so happy, but that we shall have to earn what we get there and elsewhere by the sweat of our brow. We do not mind that. The will to work is one of our national attributes, and the will to win through fair play is a typical American characteristic. That we are doing both is shown by statistical data.

In 1914 our exports to Asiatic countries were approximately \$113,000,000. In 1919 they were more than \$700,000,000, and during the first six months of 1920 they have amounted to more than \$800,000,000. The "saturation point" has not been approached. Besides, we buy there more than we sell.

Far East Unlimited Market.

It indicates ignorance to say that the Far East is a limited market. American manufacturers and exporters will be more nearly right if they regard it as a limitless field. There is probably no other market in the world more susceptible to enormous expansion and no other where we have the inside track to such a favorable extent. They were compelled to buy here during the war, but found our products so satisfactory and so well adapted to their needs that they

In the belief that all in the industry, the manufacturer now operating in that territory, the manufacturer who is considering the project, and the manufacturer who has not yet delved into the subject, will be actively interested, MOTOR TRUCK has asked an authority on oriental markets to write the subjoined article regarding the products, requirements, conditions and possibilities of Asiatic countries.

continue purchasing from us in increasing quantities. It is up to us to hold their trade and good will through meritorious service and products.

Order taking is but one phase in the development of our foreign trade, and our export policy must contemplate more than merely placing our merchandise on board ships and sending it abroad to people whose wants are so insistent that they will agree to pay for them far in advance of receipt and in accordance with the most exacting terms and conditions that the seller chooses to impose.

Our programme must include investigation of actual and potential markets for our goods and distribution through official and commercial channels of the data thus obtained; education of our farm and factory workers so that they may understand that their prosperity will be increased through American effort and ability to develop and maintain overseas markets for our manufactures, and enlightenment of our financial, industrial, commercial and shipping interests so that they will understand that paralysis, complete or partial, faces those industries which have no outlet other than domestic for their out-turn of finished products.

Strong Buying Power.

There are honest, good-as-gold concerns in the Far East, whose financial and moral standing entitle them to the highest consideration. They may not be rated by Dun or Bradstreet for the reason that the reporting service of those agencies does not cover every field. I have been telling American merchants not to turn down an order nor write an ill-advised letter because they had never heard of a firm from whom they have received an order and cannot find them rated, but to inquire of one of the American banks or commercial organization specializing in foreign trade, as they may find that the credit responsibility of their correspondent is triple A-1.

Although some business can be secured through advertising, catalogues and correspondence, which are very useful in paving the way, the greatest and most permanent success will undoubtedly come to the merchant who studies carefully in person or through a capable representative far eastern offerings and requirements, places his forces in the field and keeps them there, developing and embracing its opportunities.

It is a cosmopolitan group of peoples who inhabit those eastern lands, joined to our shores by the great Pacific. Certain fundamental factors are common to them all, but there are sharp contrasts in language, climate, topography, religion, products, requirements and merchandising customs. Each racial and national group differs from the others in many ways, but the broadest divergences are found when comparison is made with us. Fundamentally, there is not much difference. As with us, they require food, apparel, tools, implements and machinery, transportation, power equipment and many other commodities which we produce abundantly, and they are quite as willing and many are quite as able as we are to pay the price for what they need or want. As with us they buy over and over again what suits them.

Many persons think of Asiatic countries as wholly agricultural and pastoral; as exporters of raw materials only and importers of finished products only. It surprises most stay at homes to learn that in nearly all those countries important industrial enterprises are developing rapidly along modern lines. Today Japan is a keen competitor on many articles and gives promise of becoming a great manufacturing nation. Manufactures are increasing in China.

Since American occupation the Philippines is fast becoming an industrial country. Indo-China manufactures several products. British Malaya has important tin and rubber works and is developing cement, glass, vegetable oil and other enterprises; Burma has its rice mills and oil refineries and Siam its rice mills; India runs neck and neck with



Quay at Penang, Showing Sacred Cows Doing Work Trucks Can Do Better.

Japan, and competes with us and Europe in textiles, and steel and iron products. Besides, it has a great jute industry on which it holds practically a world monopoly, exports in that line totalling more than \$200,000,000 during the fiscal year ended June 30, 1919; Ceylon had over 1200 factories registered in 1917, and the Dutch East Indies government has adopted a self-sustaining programme on many lines, which it is steadily following with characteristic solidity and perseverance. But few of these developments were conceived, initiated or carried out, except perhaps in Japan and India, by natives. They represent American and European quickness to see and seize the main chance.

The Asiatic generally accepts the dictum that "whatever is, is right," and is usually content to let well enough alone. Inventive genius and initiative are not common to him. But he is willing to be shown and is quick to see the benefits of a better way. He acquires mechanical skill readily and is soon at home amid whirring wheels. His willingness to work hard and uncomplainingly for small pay during long hours, giving a maximum "60 seconds worth of distance run," makes of him a sought for aid to capital in the development of the great resources of those lands.

Receptive to Progress.

Show the Filipino that a better grade of sugar can be produced more profitably in a modern sugar mill than by the primitive process of squeezing the cane between two cylinders, slowly revolved by a mile an hour caraboa, and then evaporating the water content from the juice in an open pan, and he with neighboring planters will soon erect a sugar central; show a Singhalese cocoanut oil mill owner that an expeller and hydraulic press will produce more oil at less cost per ton than his ancient press made from the hollowed out butt of a tree, all wound round with steel hoops or wire, with pressure applied by means of sacred bulls hitched to the end of a long beam, and he will quickly install modern machinery; show a Chinese rubber estate owner that he can keep the ground clean between his trees at less expense per acre with a tractor and modern plowing equipment than with a gang of coolies wielding "changkols," and that deep plowing benefits his trees and increases their latex yield and he will buy a tractor instant; show him that with a motor truck he can haul his rubber, tapioca, cocoanuts, tin and other products at less cost per ton mile than with bull carts and he is a truck user for the rest of his days.

Education in the uses of labor saving, cost reducing tools, implements, machinery and methods is the "open, sesame," to a wonderful storehouse of wealth. Demonstration is another key to the same door. As the Chinese say in idgin English "One look-see more better than muchee talkee-talkee," which translated means that "demonstration is better than description."

The Truck Is the Answer.

The Far East has never had a satis-

factory animal for carrying, pulling and hauling. Native horses, mules and donkeys are scarce, undersized, intractable and often vicious. They are not adapted nor adaptable to usual plowing and hauling requirements. Other work animals are slow and not numerous and disease frequently decimates the limited supply. The carabao, a species of water buffalo, has been the mainstay of agriculture and transportation for centuries. He is strong, but so slow that you wonder if he will ever get there and back. His snail like pace induces, psychologically, mental and physical sluggishness in his master. He is an economic error. Soon he will be a back number, an out-of-date curiosity. He is indigenous to the tropical Orient and is found also in Japan and China, but to a greater extent in the Philippines, Indo-China, Siam, British Malaya and India. He moves much more slowly than the bullock, except when he runs amuck and then he travels with the speed of an express train. He has never outgrown his amphibious desire to submerge himself in water or mud, leaving only his nose out for air.

In rural districts, carabao are usually worked in shifts of one or two hours each. While one is pulling the plow the other is taking a bath. In cities, drivers of carabao carts carry a bucket slung underneath their carts and stop now and then at a hydrant or convenient stream or pool to give the animal a shower bath. When he "goes dead" the driver "cranks the carabao" by twisting his tail. It is a long jump from this slow moving brute to speedy truck and tractor, but Oriental planters are taking the leap. Their products are in good demand and the planter who depends upon water buffaloes knows that he cannot compete with those who utilize trucks, tractors and other labor saving equipment. In 1914 the United States exported only 58 tractors to the Far East and most of those went to the Philippine Islands. In 1919 we shipped over 2000 tractors to that market.

"Growing" Year Around.

The average Filipino small farmer supplies his needs from a limited area. He has 12 months a year of "growing" weather. If he desires to do so, he can take off annually three or four crops of rice, corn, potatoes, vegetables and other food stuffs. The soil is rich in nitrogen,

humus accumulates quickly, moisture is abundant, and tropical warmth is constant. It sounds unbelievable, but I have personally measured for several days guinea grass that grew almost an inch a day. From a small plot of alfalfa I cut once a month for 12 months in the year, green forage that had grown from 26 to 28 inches between cuttings.

During American occupation industry and large scale agriculture have developed rapidly, notwithstanding the hesitancy of capital to invest there.

There are about 800 miles of railways in the Philippine Islands and certain new construction is planned. The Manila Railroad company, which is government owned, has approximately 600 miles on the Island of Luzon, and the Philippine Railway company, principally owned by New York interests, has nearly 200 miles on the islands of Panay and Cebu. The government is planning to extend its system to link up the provinces of Surigao Albay and Ambos Camarines and to tap the rich provinces of Nueva Vizcaya and Cagayan, the great tobacco producing district. For several years truck and motor bus lines have served as feeders to the railway systems. "Ship by truck" is followed literally in the "Land of the Palm and Pine."

Railroads Welcomed.

The construction of first class highways in the Philippines meets with great favor on the part of the Filipino people. There was a time when the Filipino travelled contentedly in a caratela, jolting and bumping over roughest roads and sharing with several of his fellows its discomforts and trifling expense. Today he spins over smoothest drives in his super-six, reveling in its exclusive luxury. One of the finest monuments that could ever be raised to William Cameron Forbes is the network of well built first class motor roads constructed during his administration and largely through his efforts. That was one of his practical hobbies.

During the first six months of 1920 the Philippine Islands imported a total of nearly \$60,000,000 worth of merchandise, in which the automotive industry shared to the extent of nearly \$3,000,000, and exported more than \$85,000,000 worth of their products.

(Continued in April Issue.)



View Shows That American Railways Have Nothing on Those of Far East.

WHO'S WHO ON SALES FIRING LINE

DEFIANCE SEES BIG FUTURE FOR TRUCK INDUSTRY.

The Defiance Motor Truck Co., Defiance, O., is laying plans to go into full production at an early date, optimism as to the immediate future of the industry being present in volume at the annual meeting Jan. 19, when the following officers and directors were elected: President, C. H. Kettenring; vice president and general manager, J. C. Ayers; vice president and works manager, Charles Behringer; secretary, H. R. Morse; treasurer, J. F. Robertson. Frank W. Warrington, general sales manager, was also added to the board of directors.

Sales of Defiance trucks have shown a steady increase and the chiefs of this organization feel that the truck industry faces a period of growth and prosperity within the next few years equal to the marvelous development of the automobile business during the past six or eight years.

As a result of the Defiance policy of giving representation on the board to the sales, engineering and manufacturing departments, greater coordination of effort is secured throughout the business as a whole and a consistent, unified plan of development has been adopted and followed.

During the three years which have elapsed since the building of the first Defiance Speed Truck, which was in reality the first motor truck to be designed especially for pneumatic tires, the company has been steadily increasing production to meet the rapidly growing demand for speed truck transportation.

Every member of the Defiance sales organization either has been a dealer at one time or has sold trucks at retail. With a wide knowledge of dealer problems to guide them, they have perfected a distributing plan which carries some distinct advantages to the local dealer, and which are offered for the first time by any manufacturer as a definite part of the Defiance franchise.

U. S. GUARANTEES AGAINST PRICE DROP.

As its contribution to the widespread movement to stabilize prices in the automotive industry the United States Motor Truck Co., one of the very oldest concerns in the business, has issued a guarantee against decrease effective until July 1 of the present year. The announcement was made recently in a letter addressed to all salesmen, dealers and distributors.

NEW WINTHER DISTRIBUTOR.

The Harper-Libby Co., Inc., 801 Beacon street, Boston, Mass., has been appointed distributor of Winther motor trucks in eastern Massachusetts.



The time has come to take the "cuss" out of "customer" and substitute "buy" for "alibi," remarked O. M. Vett, as he wafted ceilingward a series of smoke spirals from a choice Cabbago.

"The buyer is already beginning to flirt," he went on "He only needs a good talking to in order to be brought to a serious mood. Only a high powered salesman is required to get him into line. "Sales engineering" methods and "selling research" have their place. Utilize them, but remember that they get nowhere today unless backed by the old-fashioned, out-grown, almost forgotten plan of going out into the market place and hustling for business.

"The successful salesman will be the one who makes real calls on prospects. The law of averages still functions and will see to it that the earnest worker is taken care of. There are certain fundamental laws that never change, and to which there are no exceptions. The greatest of these is that the more customers interviewed the greater the volume of sales.

"One of the first requisites of a successful salesman is a stout pair of shoes. He must cover territory to make sales. Ten calls a day is better than five. This will work out as true in every case. Go after your territory with the idea of getting all there is in sight. Comb it carefully. Don't pass up a single chance.

"The greenest grass doesn't necessarily grow on the distant hill. There may be some at your doorstep that you haven't noticed. Always remember that the end of the week will see a certain number of sales made in your territory. If your name isn't numbered with those who have helped to bring this about, there is something wrong with your method. The chances are that you haven't made the proper number of calls. Maybe you've made calls enough but you've let the other fellow sell you a hard times story instead of selling your line.

"In my humble opinion there have been too many fine spun theories introduced into the trade of selling trucks with the idea of dignifying it as a profession. It is a profession, and a highly remunerative one, but the fellow who sits back and theorizes does not belong out on the selling line. That should be a dead line where only the gogetter and the dig-em-up and stick-to-em type should get the right of way."

BAY STATE FACTORIES MAY USE TRUCKS EXCLUSIVELY

If railroad rates are further advanced 132 members of the Associated Industries of Massachusetts have stated that they would use trucks exclusively. In many cases this would necessitate new fleet complements. If railroad rates and truck rates and service were equalled 138 indicated they would use rail; 59 would retain truck service and 52 were uncertain.

For 50 per cent. of members out of town transportation is done by outside firms; the other 50 per cent. use own trucks. Most of the shipments are L. C. L. The average saving reported on each shipment as compared with railroad is 45 hours.

BEARDSLEY WINTHER DISTRICT SALES MANAGER.

The Winther Motor Truck Co. of Kenosha, Wis., has appointed W. A. Beardsley district sales manager for the states of Washington, Oregon and Idaho. Mr. Beardsley has been associated with several large distributing companies on the Pacific coast and is well known in the truck industry.

TRANSPORT MEN AT CHICAGO.

The Transport Truck Co., Mt. Pleasant, Mich., was well represented at the Chicago Automobile Show. In attendance were: M. A. Holmes, president and general manager; H. E. Chatterton, vice president and assistant general manager; F. D. Engle, sales manager; Ludwig Arnson, special sales representatives, and Glenn Rockwell, eastern district manager.

BIG FEDERAL TRUCK SALES.

Total sales of the Federal Motor Truck Co., Detroit, for the year 1920 amounted to \$10,628,742, this surpassing the 1919 sales by \$103,470. Net profits for the year were \$745,878, before deducting for Federal taxes, which are estimated to be about \$200,000.

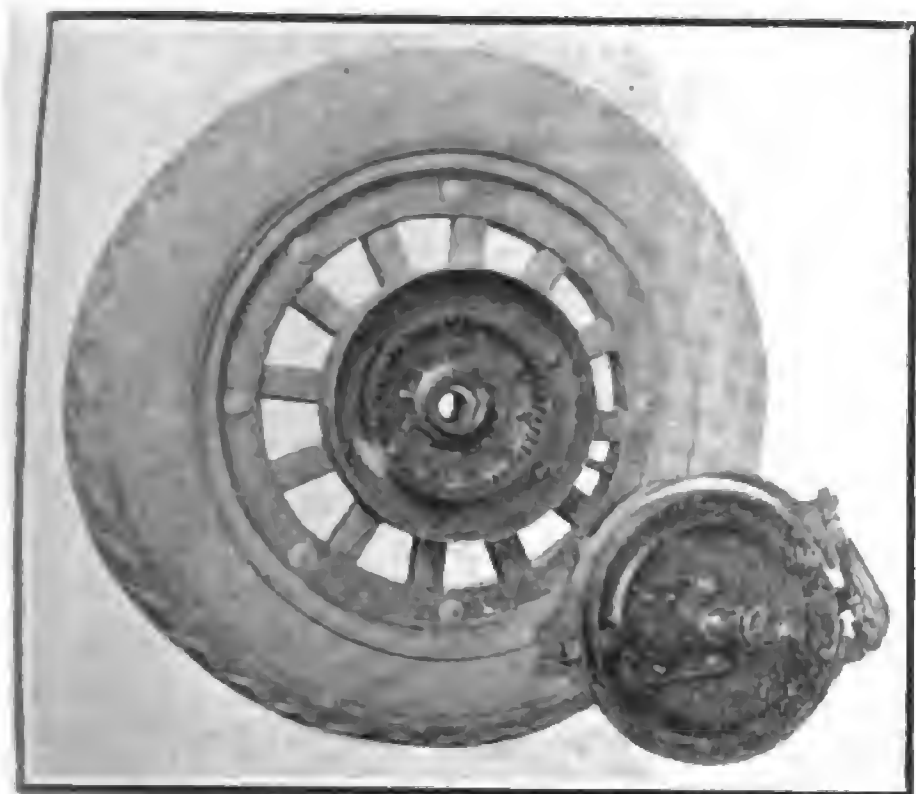
SELLING AT ROCHESTER SHOW.

The Rochester, N. Y., automobile show was a selling event par excellence. Something like a half thousand sales were recorded during the week. There were 78 motor trucks on exhibition and an entire building was given over to the accessory display.

WINTHERS IN MEXICO.

A. J. Landrum of Laredo, Tex., has been appointed distributor of Winther motor trucks for southern Texas and the states in northern Mexico.

AVERY CO. ENTERS THE TRUCK FIELD



Internal Gear Drive Avery-Torbensen Rear Axle Disassembled.

THE Avery Co., Peoria, Ill., for many years prominent as successful manufacturers of power tractors, motor cultivators, tractor plows and grain threshing equipment, has entered the commercial vehicle field with the Avery one-tonner, which offers several unique structural features in a one-ton truck designed for economical and quick delivery purposes.

Many of the structural units are considered as standard with manufacturers, while other units, such as the engine, governor, radiator, clutch and gearset are of the company's own manufacture. **Six-Cylinder En Bloc Unit Power Plant.**

The Avery one-ton truck is powered by the Avery six-cylinder engine, which is also used in the cultivator and tractor made by this company. The advantages of the six-cylinder engine are claimed to be greater flexibility than can be obtained with an engine of a less number of cylinders; perfect balance, which can only be obtained from a six to 12 cylinder engine; and a more uniform torque than is given by a four-cylinder engine.

The engine is of the water cooled type, water circulation being by thermo-siphon system, which has the advantage over pump circulation of warming up more quickly in cold weather, as there is no circulation of water until the water in the water jackets becomes heated. The radiator, mounted at the front end of the truck, is of the cellular type, made by the Perfex company. It is especially large and is thoroughly supported by a case housing which is spring mounted on the frame. The capacity of the water system is approximately eight gallons.

The fuel system consists of a 14-gallon cylindrical tank, mounted under the seat; a Stewart vacuum tank, mounted on the dash under the hood and connected to a Stromberg type M I carburetor. The carburetor receives air through a tube connected with a hot air stove mounted on the exhaust pipe of the motor.

The ignition system consists of a type T K impulse starter K-W magneto.

The engine is equipped with a West-

inghouse electrical generator, driven from the governor shaft, through a flexible coupling, and a Westinghouse starting motor, connected to the flywheel of the engine, through the Bendix drive, and a Willard storage battery.

On the dash is mounted an instrument panel containing a switch giving "Off," "Dim" and "On" positions. A Westinghouse ammeter, a spark advance lever and an impulse starter trip for the magneto, as well as a dash lamp, are also mounted on the panel.

The dash also carries starting switch, a carburetor choke and a hand throttle control lever.

Clutch and Transmission Gearset.

At the rear of the engine, and forming a part of the unit power plant is mounted the transmission gearset case, which carries a 13 plate dry disc clutch. This clutch consists of 13 steel discs alternately driving and driven, of saw steel, made by the Atkins Saw Co. The clutch surfaces are frictioned with moulded Raybestos material, securely riveted to the alternate clutch plates. Clutch pressure is supplied by a single coil spring of extra large size, while the clutch pilot bearing consists of a radial ball bearing, and the clutch throwout bearing is a ball thrust ball bearing. The clutch shaft is made of high grade nickel steel, carbonized, hardened and ground to size, supported in the transmission gearset case by a Gurney radial thrust ball bearing.

Direct Drive Gives Speed.

The square shaft carrier is fitted with two sliding gears, giving a three-speed forward and one reverse gearset. High speed is obtained by direct drive. The second speed gives a reduction of $1 \frac{2}{3}$ to one, low speed $3 \frac{1}{3}$ to one, and reverse four to one. All gears and shafts are made of high grade nickel steel, properly carbonized and hardened, to give maximum strength and withstand wear. The gearshift forks and gearshift handle are drop forgings of high grade steel, as is the hand brake lever, which is mounted at the right of the transmission gearset case. Provision is made at the side of the gearset case to fit a standard power pump for tire inflation

purposes, by simply removing the cover over the reverse idler gear, which is made according to standard determined by the S. A. E.

Power is transmitted from the transmission square shaft to the rear axle through a propeller shaft fitted with universal joints front and rear.

The rear axle is an Avery-Torbensen internal gear driven type, consisting of a drop forged weight carrying member, independent of the power transmitting mechanism, which consists of a conventional bevel and ring gear, the latter mounted on a Powrlok differential, which drives the jack shafts carrying the pinions, which mesh with the internal gears mounted on the rear wheels.

Advantages Claimed for This Type of Axle.

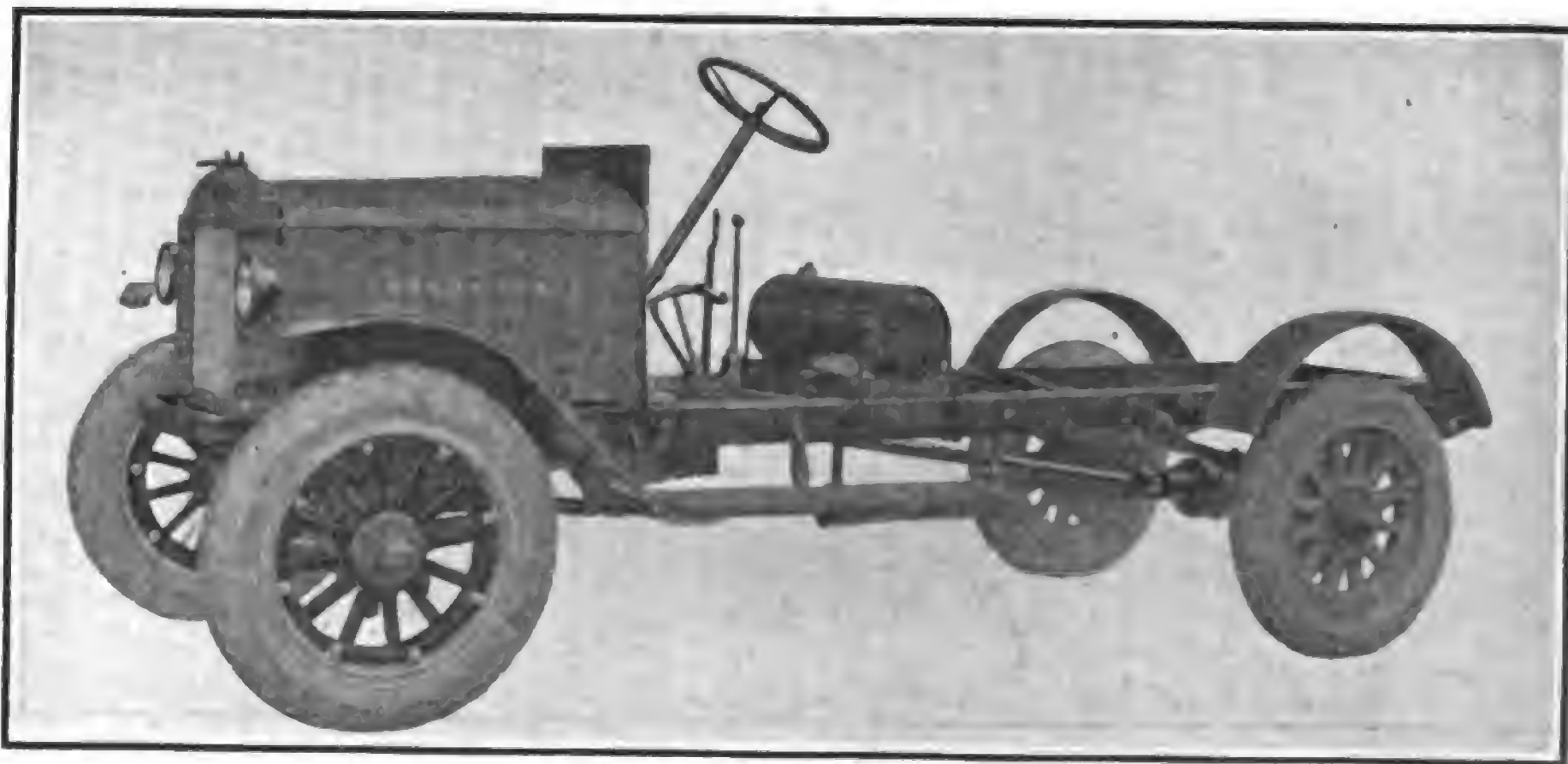
The advantages claimed by the company through the use of this type of axle in the Avery one-ton model is that there is less weight in the axle for equal carrying capacity; that increased road clearance is gained by its use; that greater reliability and uniformity of strength is obtained by using steel forgings instead of cast or built-up housings, and that increased efficiency at low speeds is obtained by its use, giving the internal gear driven truck a quicker getaway than can be obtained from other types of axles. This axle gives an eight to one gear reduction at the rear wheels.

The driving effort of the truck rear axle is transmitted to the truck through the medium of the springs, this being known as the Hotchkiss drive. Its advantages over the use of radius rods is claimed to lie in the fact that road shocks cannot be transmitted through the rigid radius, but are conveyed through the springs, and the life of the truck is therefore increased.

The brakes consist of an internal expanding brake operated by hand lever and an external contracting brake, operated by the right foot pedal, through the necessary brake linkage.

Units Well Balanced.

The frame of this truck, which is of pressed steel, is made by the A. O. Smith



Chassis of Avery One-Ton Truck, Showing Rugged Construction of Units and the Clean Lines.

Corporation of Milwaukee and consists of side channels, each five inches deep with two-inch flange, the material being 3/16 inch thick, securely fastened and held together by means of three cross members and a front bumper, all riveted together and properly gusseted for maximum strength and flexibility. Riveted to the frame are the step hangers, of pressed steel, the brake rock shaft hangers of cast steel, the rear spring brackets, also of cast steel, and the tail lamp bracket, a steel forging.

The front end of the frame carries a single transverse spring of vanadium steel. This spring is held to the frame by means of nickel steel "U" bolts, heat treated, to get maximum strength. The lower ends of front transverse spring are supported through drop forged spring shackles and hardened and ground spring shackle pins.

The axle is supported from the front steering knuckles, which are of the inverted Le Moine type. The steering knuckles turn in bronze bushings pressed into the front axle beam, and the weight is supported through ball bearings running in an oil bath. The spindles of the steering knuckles carry Gilliam taper roller bearings, on which the wheel hubs are mounted.

The combination of the Avery front axle and the Ross steering gear makes steering as easy as most touring cars.

The rear end of the frame is carried by means of two chrome vanadium steel springs, the front end of the spring working on hardened and ground steel pins fastened in the spring brackets. The rear ends of the springs are connected to the rear spring brackets through cast steel spring shackles. All springs carry phosphor bronze eye bushings, the combination of the phosphor bronze bushings and the hardened and ground pin, giving a bearing which, when properly lubricated, is practically indestructible. The rear springs are of the semi-elliptic type, so that when used to transmit the drive from the rear axle, which uses the Hotchkiss drive, they will not tend to buckle and break.

The front axle carries cast steel torsion brackets, securely bolted to pressed steel torsion arms, which in turn are riveted to a drop forged steel torsion ball, which works in ball sockets fastened to the bell housing on the motor. By means of this construction, namely, a single transverse front spring and the ball joint on the torsion arms, the greatest amount of flexibility is obtained, so that any inequalities in the road are easily cared for.

Both front and rear wheels are fitted with Goodyear rims and carry Goodyear 34x5-inch all-weather tread pneumatic cord tires. A spare rim is furnished as standard equipment, this rim being mounted on a tire carrier, which is fastened to the right hand side of the body.

Lubricating System.

With the exception of four oil cups, all parts are lubricated by means of the Alemite grease gun system, which is regularly supplied with the truck. This consists of a grease gun and flexible tube connection, which enables a very high pressure to be obtained on the fittings, forcing the old grease through the bearings and supplying new, clean grease. Front hubs make it unnecessary to remove the hub caps.

Equipment.

A Klaxon electric horn is mounted under the hood and is operated from a button on the steering wheel. Regularly supplied are also a tool kit, consisting of various sizes of wrenches, pliers, hammer, etc., a hand operated air pump and a jack. The entire truck is painted in a black enamel.

The company states that it is in a position to supply an all-weather cab, a grain body (for which it can also furnish a hog rack) and a stake body.

The Avery motor truck is regularly equipped at no additional expense with pneumatic cord tires; front and rear wheel fenders; Alemite lubricating system, tool kit, hand pump, Westinghouse two-unit starter and generator, Willard truck type battery, Klaxon horn, double bulb head lamps, tail lamp with license

bracket and dash lamp. Also one extra demountable rim.

The weight of the chassis only is approximately 2800 pounds, cab 200 pounds, stake type of body 575 pounds and grain type of body 400 pounds.

The wheelbase is 129 inches with a standard tread of 56 inches.

THE TIMKEN MAGAZINE.

The Timken Magazine, published by the Timken-Detroit Axle Co., is now devoted solely to the interests of that company. Since it was first issued in 1912 it was the joint organ of the Timken-Detroit Axle Co., and the Timken Roller Bearings organization. The cover of the January-February issue is in colors and the entire book is a choice bit of art. It is replete with drawings and photographs and the text is of high interest.

COMING EVENTS.

March 12 to 19, 1921—Boston, Mass. Nineteenth Annual Show, Mechanics Bldg. (105,000 sq. ft.) Passenger cars, trucks and accessories. Chester I. Campbell, Mgr., 5 Park Place.

March 14 to 19, 1921—Omaha, Neb. Sixteenth Annual Automobile Show. Auditorium. Omaha Automobile Trade Assn., Inc. C. G. Powell, Mgr., 2051 Farnam St., Omaha.

March 15, 1921—Fort Worth, Tex. Twenty-fourth Annual Southwestern Exposition & Fat Stock Show. Passenger cars, trucks and tractors. M. Sansom, Jr., Sec.

March 19 to 26, 1921—Detroit, Mich. Twentieth Annual Show. Morgan & Wright Bldg., Jefferson Ave. (150,000 sq. ft.) Passenger cars, trucks and accessories. Auspices of Detroit Automobile Dealers' Association.

March 21 to 26, 1921—Torrington, Conn. Company M. State Armory. Passenger cars, trucks and accessories. J. J. Callahan, Mgr., Box 1186, Pittsfield, Mass.

March 21 to 26, 1921—Norfolk, Va. Second Annual Show. The Tabernacle (27,820 sq. ft.) Passenger cars, trucks, tractors and accessories. John W. Gates, Dir., Monticello Hotel Lobby.

March 21 to 26, 1921—Cedar Rapids, Iowa. Eleventh Annual Show. Auditorium (20,000 sq. ft.) Passenger cars, trucks, tractors and accessories. E. L. Makibben, Mgr., 527 Second Ave.

March 22 to 26, 1921—Williamsport, Pa. Second Annual Show. Lycoming Motor Corp. Bldg. (67,500 sq. ft.) Passenger cars, trucks and accessories. Address W. C. McCormick, 601 West Third St.

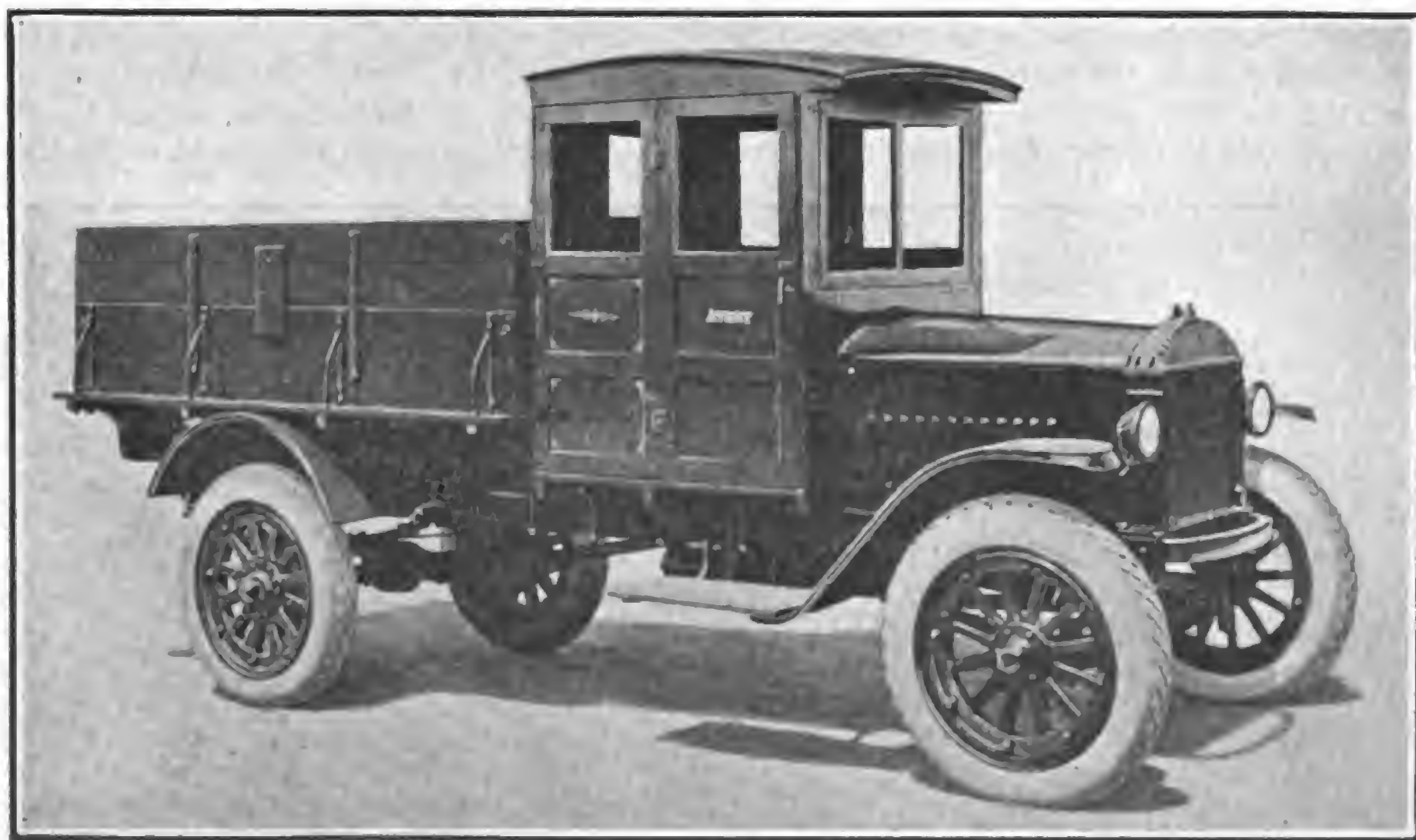
March 28 to April 2, 1921—Columbia, S. C. Fifth Annual Show. Exposition Bldg., State Fair Grounds (65,000 sq. ft.) Passenger cars, trucks, tractors, accessories and displays by merchants and manufacturers. T. E. Thrower, Chairman, Main St.

March, 1921—Poughkeepsie, N. Y. Annual Show. State Armory. Auspices of Headquarters Co. and Co. G. Passenger cars, trucks and accessories. William H. Partlan, Mgr., Box 1453, Pittsfield, Mass.

April 4 to 9, 1921—Gloversville, N. Y. Gloversville-Johnstown Second Annual Automobile Show. Armory. Auspices of Co. G. Passenger cars, trucks and accessories. James J. Callahan, Box 1186, Pittsfield, Mass.

April 4 to 9, 1921—Seattle, Wash. Third Annual Show. Arena and Hippodrome (40,000 sq. ft.) Passenger cars, trucks and accessories. William J. Coyne, Sec., 1321 Seneca St., Seattle.

September, 1921 (two weeks)—Topeka, Kan. Sixth Annual Show. Motor Hall at Fair Grounds (16,000 sq. ft.) Passenger cars, trucks and accessories. W. H. Imes, Chairman, 11th and Kansas Ave.



Grain Body and Enclosed Cab Furnished with Avery Six-Cylinder One-Ton Truck for Farm Purposes.

TROY TRAILERS DEMONSTRATE EFFICIENCY IN MUNICIPAL SERVICE



Left, Mack Truck and Two Loaded Trailers Starting for the Incinerator; Right, Mack Truck and Empty Trailers Returning from the Incinerator.

THE city of Memphis, Tenn., recently adopted the trailer method of collecting refuse and garbage throughout the city, delivering it to an incinerator located outside the city limits, for burning.

At present nine specially constructed trailers, produced by the Troy Wagon Works Co., Troy, O., each of three tons capacity, and one Mack 3½-ton truck comprise the fleet, but it is the intention of the city fathers to add to this equipment as necessity arises.

Previously this work has been handled by mule driven outfits at a cost to the city of 99 cents per yard, while the large force of men employed were not able to cover the city in a satisfactory manner, causing complaints on the part of householders and landlords in general.

The adoption of the new method of collection was decided upon after studying methods employed in other cities the size of Memphis, and the large mass of figures available showed that the collections could be made at a considerable saving to the city, by dividing the city into zones, with central points at which the loaded trailers could be collected when loaded and covering the entire city at regular periods, it was found that the work could be done at a great saving in time.

Collections are made with separate trailers drawn by mules, as this method was decided as the best because many of the streets are narrow and many times end in blind alleys, making truck operation impossible.

After the trailer is loaded it is drawn to the central point, where the trailers gather as fast as loaded, and are then drawn by a truck or tractor to the incinerator. Much time is saved by this method of collecting, and when the trailers reach the incinerator they are quickly unloaded by unlocking a catch on one end and dumping the body and load sideways onto the floor, from which point the refuse is shoveled into the incinerator opening in the floor. Tipping the body back into position and locking it prepares it for the road again.

The results to date, the city fathers say, are more than they expected, as the cost of collection has been reduced from 99 cents per yard to 65 cents per

yard, making an annual saving of about \$12,600 per year, besides the added assurance that refuse will be collected more frequently and on a more uniform schedule than formerly.

To operate the new system requires besides the truck or tractor and the nine trailers a small force of men consisting of 12 employees and six mule teams per unit.

Trailers of Steel Construction.

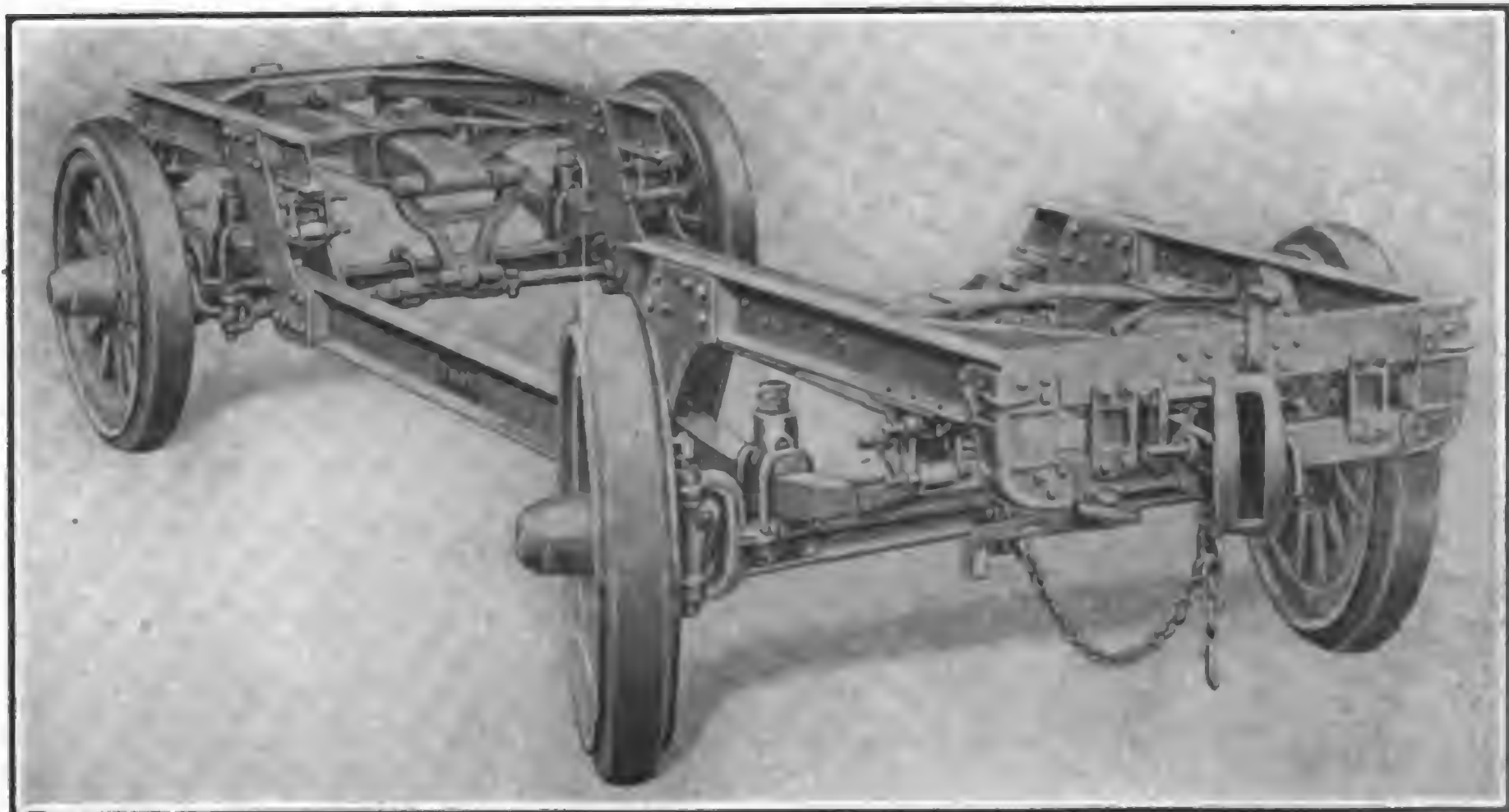
The Troy trailers used by the city of Memphis are constructed specially for this class of work and are steel throughout, with the exception of the wheels and rims, which are of wood. They are equipped with solid tires.

The chassis consists of a heavy I beam frame securely braced at the corners and sides with heavy steel braces riveted together with hot rivets, reinforced at the corners with steel stampings hot riveted, and all points are amply protected against stress and strains by heavy steel members. The frame is mounted on four semi-elliptic springs three inches wide and 44 inches long, fitted with coil spring bumpers in the spring clip pads, which act as absorbers in case of an overload. The spring ends are fitted with compression grease cups of ample size, providing lubrication for the spring bolts and bushings.

A heavy draw bar is fitted at each end.

which provides connection for hauling with mules or with the truck. Chains are fitted from the center of the I beam axles, front and rear, providing a safety hitch in case the coupling device is out of order or in case of breakage. The draw bar is pivoted to a king pin on the inner end, which allows a slight sideways motion to the draw bar. This motion is used to turn the wheels as in steering, the motion being transmitted from the end of the bar through a casting to the tie rod between the wheels, and fastened to the steering arms of the wheels by means of ball joints.

Each trailer is provided with a driver's seat at one end and a vertical metal frame at the opposite end to which the dump body is fastened for loading and hauling over the road. The frame is equipped with suitable device for locking and unlocking the body catch, while cross bars front and rear on the frame, fitted with slidable chain and spring tension, prevent the body from tipping too far when being dumping at the incinerator. The frame is of a special drop type, which allows the special dump body to drop somewhat lower than common, making loading of the body easier for the employees and facilitating dumping. The height for loading to the top edge of body is 60 inches, which the workmen claim is about right for easy loading.



Underling Troy Trailer Chassis Constructed Special for Municipal Work, Showing Rugged Construction of the Unit.

Roller Bearings Throughout.

The underside of the special body is fitted with a circular track fitting the contour of the body, this track in turn resting and turning on steel rails extending crosswise of the frame. These rails support the body when loaded, as well as supplying the necessary track for the body when being dumped. Provision is made in each front cross member for fixing stationary the draw bar when using mules for hauling, a short handled crank being provided which securely locks the draw bar. Roller bearings are used throughout in the wheels and wheel spindles, making the unit unusually easy to haul under load, and providing long life to the bearings.

Specifications.

Capacity, 6000 pounds; body allowance, 1900 pounds; tread, 64½ inches; wheelbase, 115 inches; ground clearance, 12 inches; frame length, 175 inches; height of frame under load at center, 18 inches; at ends, 32¾ inches; frame width, 43 3/16 inches; frame section, five-inch and six-inch "I" beam; axles, drop forged; bearings, double cage roller; springs, three inch by 44 inch best grade spring steel; wheels, standard artillery, hickory spokes; tires, 36x5 inch solid rubber pressed on type; loading space, at center, 66¾ inches; at ends, 54½ inches; overall width, 80 inches; turning radius, 28 feet three inches outside wheel; chassis weight, 4080 pounds.

Body Specifications.

Capacity, four to 4½ cubic yards, rounded load; height to loading edge of body, mounted on trailer, 60 inches; weight of body, 1850 pounds.

The Troy Trailer is also made in two and five-ton sizes for commercial purposes of various kinds, the three sizes completing the line. The other two sizes are similar in design, but differ in dimensions of parts.

There were 375 actual sales of passenger cars and trucks at the Kansas City show. Every one of the 74 exhibitors made at least one sale.

THE MOTOR TRUCK

PORTABLE MOTOR CRANE AN ECONOMIZER IN MANY FIELDS

A new form of motor crane, mounted on a Mack 7½-ton chassis, has proven capable of setting more telegraph or trolley poles than could be set by three gangs of men dependent upon hand methods. When equipped with a clam-shell bucket it effects similar economies over manual operations in unloading bulk material from freight cars to pile or from car to truck. For excavating contracts, which are not of sufficient size to warrant the moving of a large and cumbersome steam derrick, this portable crane is also adapted to effect substantial economies.

The crane is of the full swinging, self-contained type, rotating through 360 degrees, and is driven by a separate four-cylinder gasoline motor. This motor is designed with an extra large flywheel so as to run smoothly in spite of sudden application and release of loads. The capacity of the crane is 8000 pounds.

The particular advantage of this crane unit is its ability to move rapidly from place to place. This makes it especially adaptable for operations which must be undertaken quickly, or for work of short duration where more time would be spent in transporting the customary steam driven or crawler type equipment to the site than in doing the work after arrival.

Some of the special uses to which equipment of this type may be put are: Clearing streets of wreckage resulting from fire or collisions, handling trolley rails and setting up heavy pieces of machinery. As the entire crane is demountable the truck chassis may be also used for general transportation purposes.

Every performance of this crane in actual work to date has added to the belief that this unit will win a standard rating in the field for which it is designed.

TRUCKS AT GOOD ROADS SHOW.

A considerable number of trucks were shown at the good roads show at Chicago in February. The merits of the truck as an agency in doing effective construction work and saving time, money and labor in the process were put before the contractors and will undoubtedly be productive of results.

With an attendance of 10,000 or more delegates and visitors and exhibits of road building machinery, methods and materials, numbering 144, renewed interest in better highways was aroused in a way that augurs well for the immediate future of the road building industry and that ushers in what promises to be the greatest era in highway construction ever known.

BETHLEHEM MOTORS' AFFAIRS NOT SETTLED.

Although several proposals for the reorganization of the Bethlehem Motors Corporation have been submitted since the company went into the hands of a receiver late last year, nothing definite had been decided upon. The plans submitted have not met with approval of creditors, and because of present business conditions no action is expected until conditions improve.

It was reported that the company had approximately 400 motor trucks on hand.

MINNEAPOLIS SHOW BUILDING.

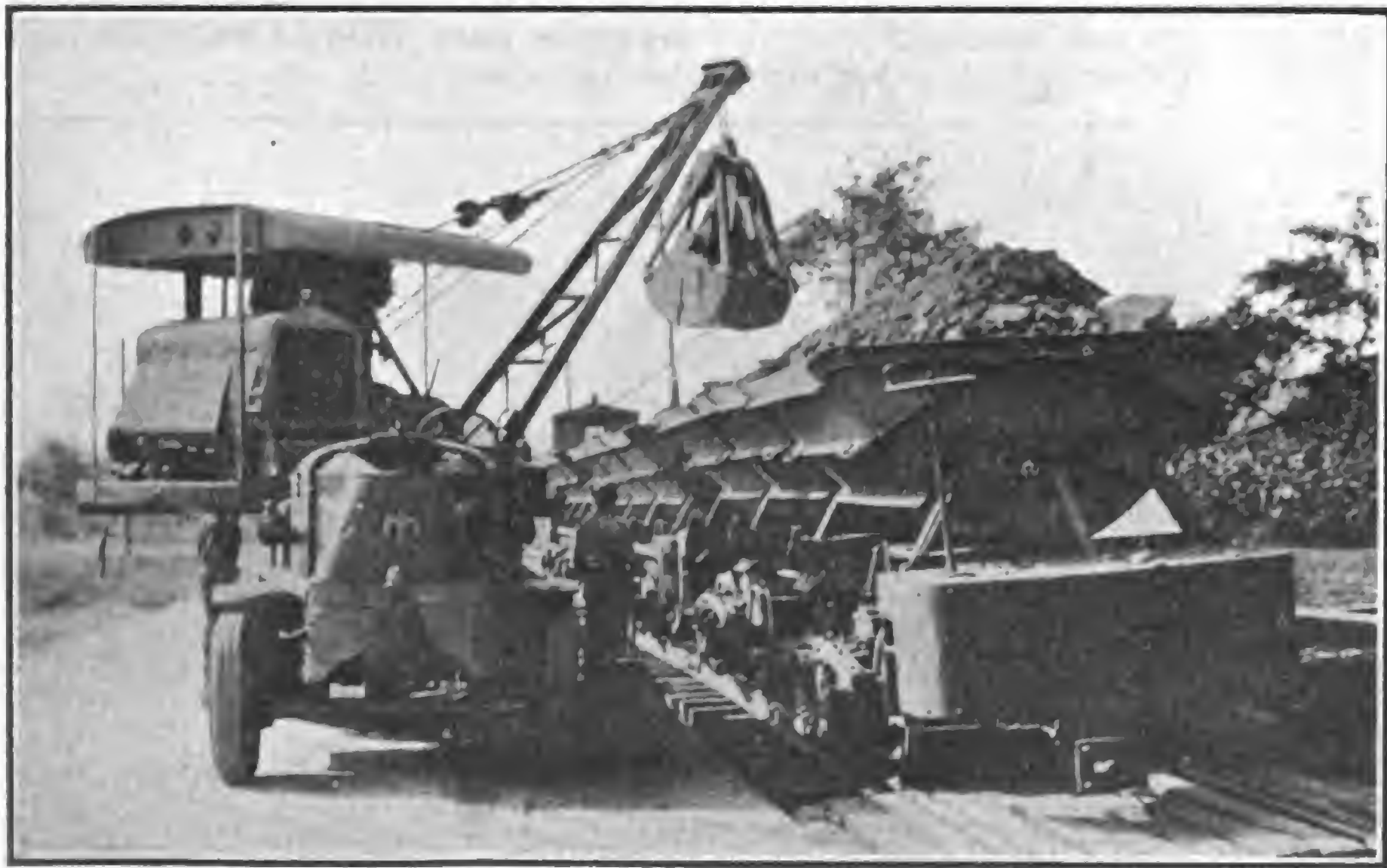
Minneapolis is to definitely have a \$500,000 new exposition building near the center of the city in time for next year's automobile show. This means that trucks and tractors will probably be shown and both transportation and farm power demonstrated. This year a majority of the trucks distributed in Minneapolis were exhibited at the show, which was a huge success. The truck section was on the entrance floor and attracted big attention. The display of automotive equipment was voluminous.

DEFIANCE DISTRICT HEADS.

District managers of the Defiance Motor Truck Co., Defiance, O., have been announced as follows: L. B. Watson, Ohio, Pennsylvania, Indiana and Kentucky; William H. Cravens, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana; John G. Robertson, California, Nevada, Utah, Arizona, New Mexico and El Paso district of Texas, and L. K. Mooers, Virginia, West Virginia, Maryland, Delaware and Tennessee.

DISTRIBUTING TWO TRUCKS.

The Superior Motor Corporation, 1828 Market street, Philadelphia, Pa., will distribute Ward LaFrance and Apex trucks in eastern Pennsylvania, Delaware and southern New Jersey.



International Motor Co.'s New Motor Crane in Action as Unit of 7½-Ton Mack Truck.

TWO HEAVY-DUTY TRUCK MODELS NEW PRODUCTS OF AUTOCAR CO.



New Model Type XXVI-B Heavy Duty Autocar Equipped with Stake Body.

FOR many years the Autocar Co., Ardmore, Pa., has confined its production to models F and G, both two-ton motor trucks powered by a two-cylinder opposed engine. These models have proved more than satisfactory in service and up to a short time ago have supplied all demands for trucks of this type in the commercial vehicle field. Production on these models has been very heavy as the company has been able to concentrate its manufacturing facilities on but two models which did not materially differ in structural details, with the result that large production was possible.

To supply a persistent demand from the trade at large for a larger, heavier truck, having greater capacity and powered by a four-cylinder vertical, instead of a two-cylinder opposed engine, that would successfully handle loads of 3½ tons with a wide margin provided for overload, the Autocar company announces two new truck models, a type XXVI-Y and XXVI-B. The hauler is thus offered a commercial vehicle which does not differ materially from previous models made by the company, and, in addition, presents features that may be considered new to Autocar construction. These few modifications have been determined by the engineers as best adapted to mesh with well known structural details of Autocar construction to maintain Autocar supremacy.

The only distinguishing feature between the two models, types XXVI-Y and XXVI-B, is that the former has a wheelbase of 120 inches, while the latter has a wheelbase of 156 inches. Longer wheelbase allows fitting longer pay load carrying bodies with the result that the trucks are adapted to all classes of heavy commercial vehicle work within their capacities.

The type of engine used in the new truck is of special Autocar design, embodying many special features which the Autocar engineers are confident puts this unit in the van among engines designed especially for commercial vehicle work. The engine is a heavy duty type, four-stroke cycle, four-cylinder, L-head, vertical, water cooled type, having the

cylinders cast en bloc, with a bore of 4¼ inches and stroke of 5½ inches, developing under N. A. C. C. rating 28.9 horsepower, and fitted with separable head, fastened to the top of cylinders by 12 steel alloy studs. A copper asbestos gasket is fitted between the separable head and top of cylinder block to prevent gas leakage.

The cylinder block is bolted to the top of engine crank case by large steel alloy studs which securely fasten it. The upper crank case is a special one-piece construction, having the flywheel housing cast integral at the rear and a forward extension cast integral for the timing gearset case. Large engine support arms which position the engine in the truck frame are cast integral with the flywheel housing, providing unusually heavy rear supports of the three-point suspension of the engine. The forward support consists of a cast cross member which is positioned in the center to a bearing, which is cast integral with the timing gearset case. The bearing is fitted with

an oil cup which provides sufficient lubrication.

The lower part of the crank case consists of a separate cast pan, which is removable for inspection of bearings, etc., having cast webs on the under side, which provide reinforcement. A drain-out plug is fitted at the side through which oil and sediment from the oil reservoir may be drained and the oil reservoir rinsed out with kerosene, gasoline or fresh oil.

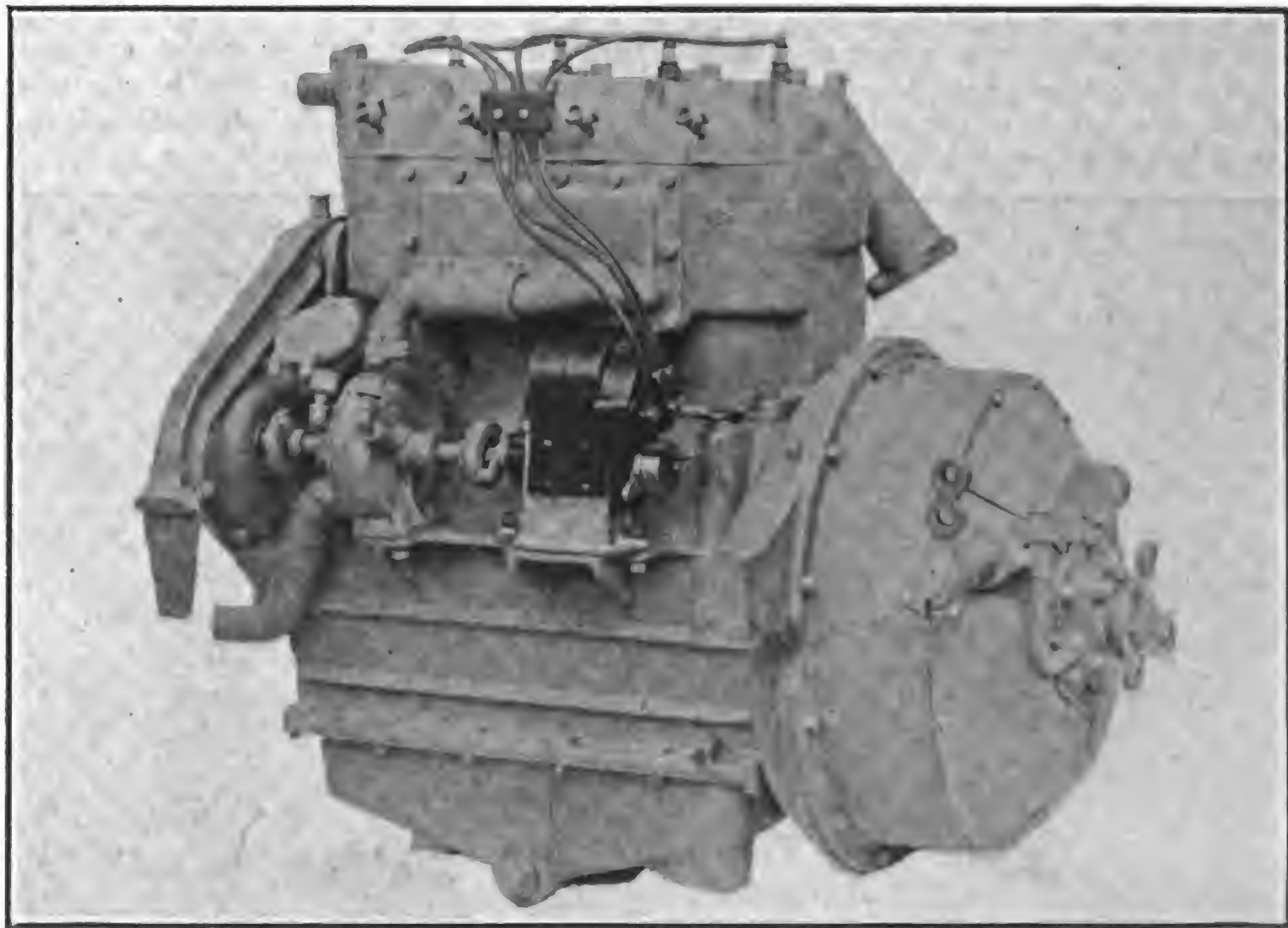
The pan is secured by a number of steel alloy studs, which fasten it securely. The crankshaft is made from heat treated alloy steel, case hardened and ground to correct dimensions, having a flange cast integral at the rear to which the flywheel is bolted, and is counter-balanced, which insures smoothness of action and freedom of vibration.

The crankshaft operates on ball bearing journals of large diameter, of the two journal type, and turns with a freedom of friction which is characteristic of this type of construction.

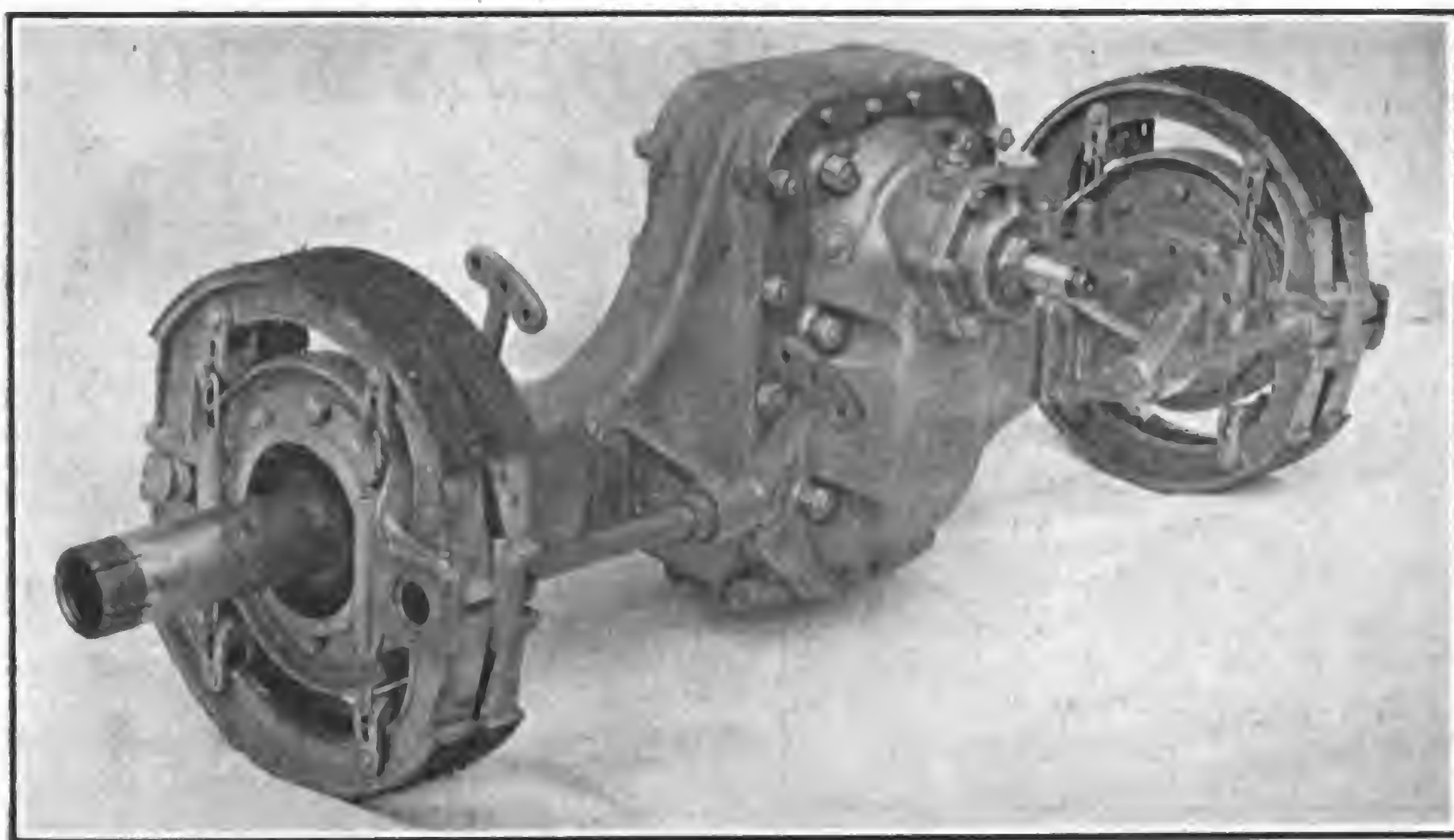
The Timing Gears.

The timing gears located in the timing gearset case at the front end of the engine are of the herring bone or helical cut type and operate in a bath of oil supplied from the lubricating system of the engine. The train of gears consist of a sufficient number to operate the camshaft and pump shaft, the latter in turn operating the high-tension magneto, which supplies the ignition for the engine. The water pump is of the well known centrifugal type, is of large size and provides a positive circulation of water to the engine at all speeds.

Carburetion is effected by means of a



Types XXVI-Y and XXVI-B Powered by New Four-Cylinder Heavy Duty Engine of Autocar Design.



Double Reduction Rear Axle Final Drive in New Autocar Heavy Duty Trucks.

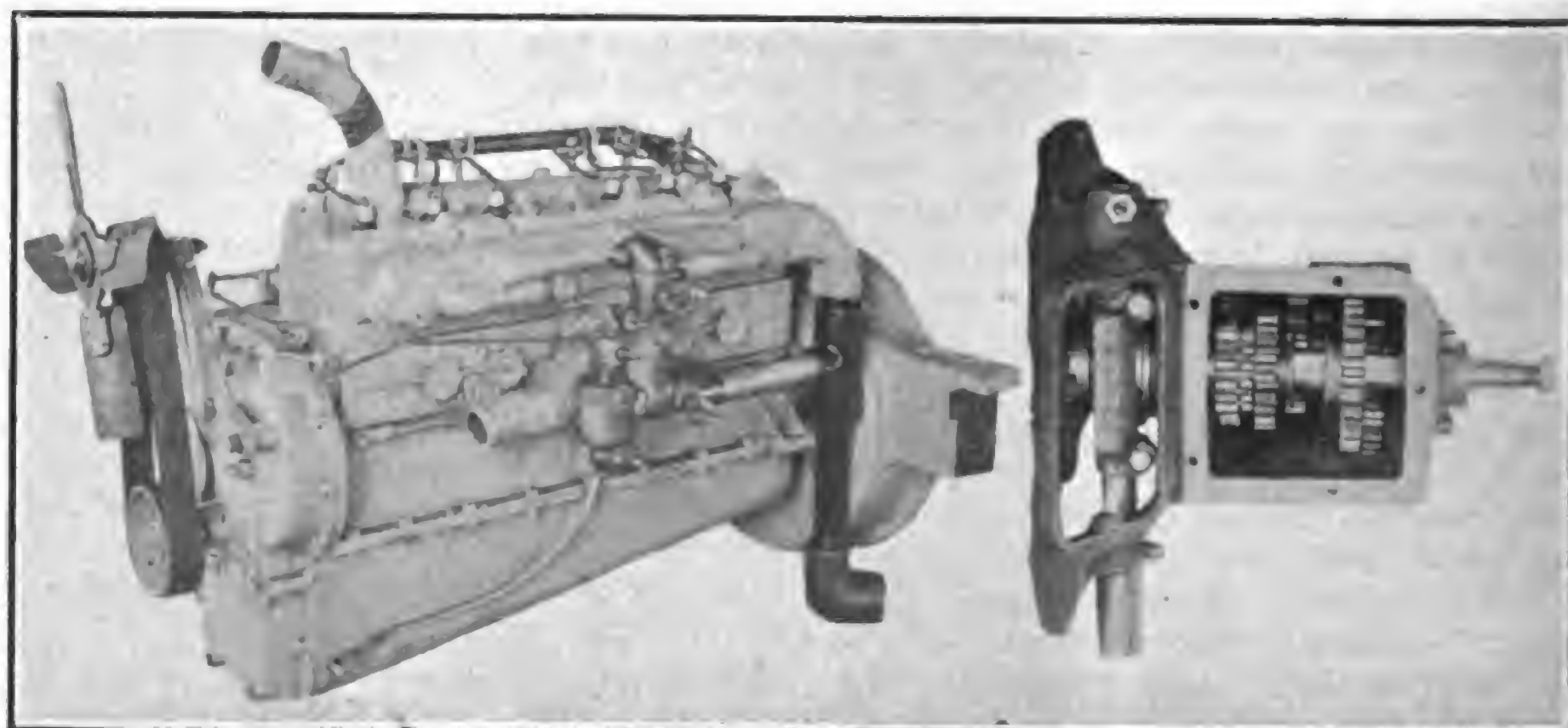
special automatic float feed type Stromberg carburetor which has proved to be economical and dependable under widely varying conditions. Gasoline is delivered by gravity from a tank of 25 gallons capacity.

Unusually large water jackets surround the cylinders, separable head and valves of the engine, preventing any possibility of the engine overheating even under the worst possible working conditions. The water circulated by the power driven centrifugal pump is forced into the top of the special vertical tube radiator, where it is quickly cooled as it passes down the length of the radiator to the bottom. A large four-bladed fan driven by belt from the engine further assists in the cooling process, thus protecting the engine from any possibility of overheating.

The engine is equipped with a Duplex governor, which prevents overspeeding, but does not interfere with the power of the engine when hill work or difficult traveling is encountered.

The engine is located in the truck chassis under the driver's seat and is accessible for adjustments by simply raising the side panels of the cab, which are hinged and fitted with louvers, which al-

low a circulation of air to reach the engine. The radiator is located in front of the driver and is backed by dash reinforcement. Water connection from the top of engine to top of radiator is made



Left: Left Side of Autocar Heavy Duty Engine Showing Special Manifolds and Hot Air Connection to Exhaust Pipe. Right: Clutch and Gearset in Unit with Engine, Showing Accessibility.

through hose connections, which are protected from the driver's feet by a sheet iron shield fastened to the back of radiator and the floor boards.

gearset being hung amidship on the frame cross members, at three points.

Provision is made in the gearset for a power take-off which becomes operative when bodies of the dump type are being used. Gear shifting is by a lever located at the right of the driver.

The transmission gearset is of the selective type, having three forward speeds and one reverse. All gears and shafts are of heat treated alloy steel, mounted on ball bearings of large size. The gearset is readily accessible for inspection and adjustment. Power is transmitted from the gearset to the rear axle by means of a tubular steel shaft equipped with universal joints at each end.

Final Drive Typical Autocar Construction.

A feature which the Autocar company retains in the final drive of the new models is the Autocar double reduction gears of the rear axle system. This system has worked out very successfully with the lighter models F and G and for this reason has been accepted by the company as the type of axle best suited



Heavy Duty Autocar Type XXVI-Y Equipped with Autocar Power Dump Body, Used by Rock Hill Quarry Company.

for use on Autocar trucks of all capacities.

Accessibility to Double Reduction Gears Very Simple.

Accessibility to the gears of this type of double reduction is very simple as a large cast plate covers the housing opening at the front and a second cast plate covers the gears and differential at the rear. The housing is of one-piece cast construction, conceded by engineers to combine great strength and resistance to road shocks, as well as to torsional strains, which may be transmitted to it from the frame through the medium of the springs.

The axle housing is of box form, provided with high arches over the openings, giving access to the gears.

The rear axle is the Autocar full floating double-reduction, gear driven type, the gear reduction being compounded through bevel and spur gears. This construction allows the necessary low reduction without sacrificing road clearance. It also reduces the angularity of the propeller shaft, giving straight lines for the transmission of power.

All the gears in the rear axle are of special steel, heat treated and carried on adjustable tapered roller bearings. The complete gear train is mounted on a cover plate bolted to the axle housing. This cover plate and gear train can be easily removed from the axle housing, facilitating inspection and adjustment of all working parts.

No Weight on Rotating Parts.

The rear wheels are mounted on adjustable taper roller bearings, carried on an extension of the axle housing. By this means the rotating parts of the axle carry no part of the weight of the car.

their only function being to transmit the power to the rear wheels. The driving axles are heat treated alloy steel.

The front axle is of drop forged steel of I beam section, with the front wheels mounted on adjustable, tapered roller bearings.

Steering is accomplished through a Ross steering gear and suitable linkage to the front wheels. All four springs are of the semi-elliptic type, and are provided with necessary bushings and a special lubricating device, so that the springs can be readily and easily lubricated. The frame is made of pressed steel of channel section, riveted at all joints with hot rivets and amply braced with heavy cross members. The depth and thickness of the frame are sufficient to insure a large margin of safety under the loads to be carried. The frame is so fitted with cross members and braces as to combine great strength with the necessary amount of flexibility. A heavy bumper is fitted at the front end of frame, which amply protects the radiator and lamps in case of accident.

Dimensions.

	XXVI-Y	XXVI-B
Length of wheelbase.....	120"	156"
Length over all from front of bumper to end of frame	204"	259"
Width over all to outside of hub caps, front wheels	76½"	76½"
Width over all to outside of hub caps, rear wheels	81¼"	81¼"
Length of frame back of seat	121"	176"
Turning circle.....	42"	54"

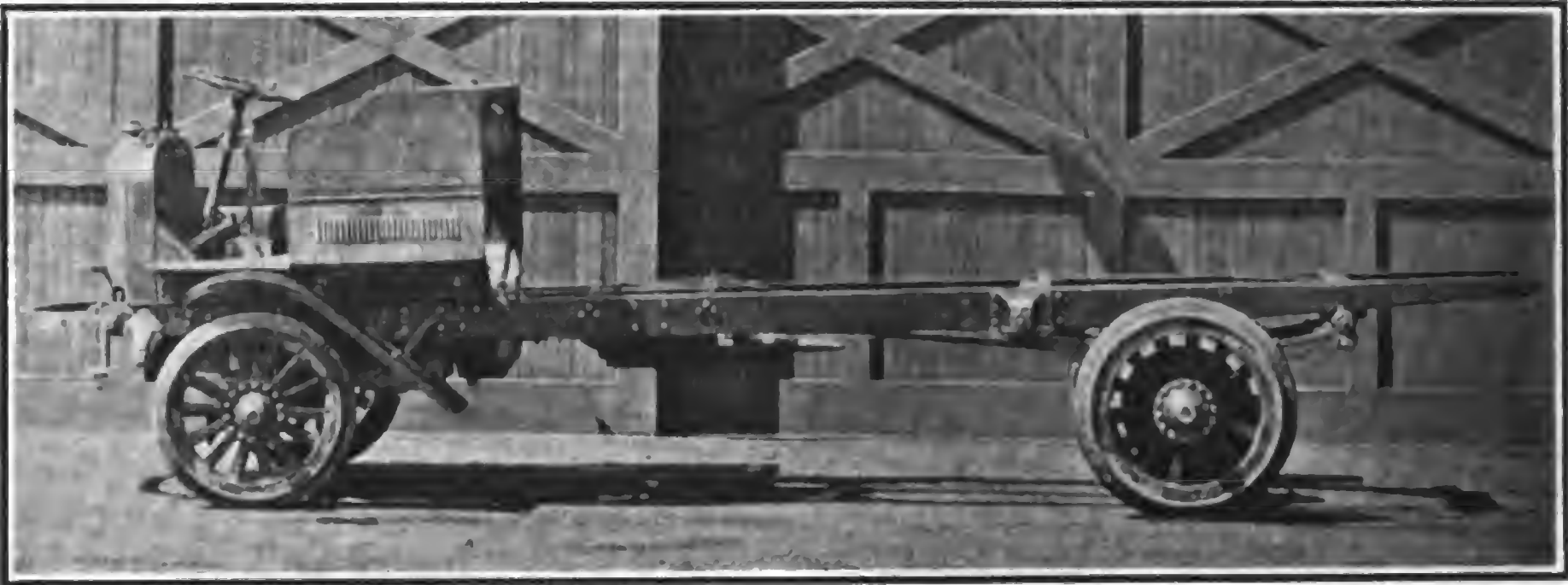
Regular Equipment.

Tires, solid all round, front, 34x5 inch; rear, 36x10 inch single.

Gas headlights and tank, oil tail light. horn and kit of tools.

Bodies, optional, standard bodies always available, the company will furnish blue prints of special body designs upon request.

It is stated that the variety of bodies adapted to the Autocar chassis is indicated by the fact that Autocars are doing the hauling for concerns in all lines of business.



Autocar Heavy Duty Chassis with Heavy Duty Engine Located Under Seat.

THEATRICAL INDUSTRY A TRUCK MARKET

Is the one-night stand which was wont to brighten the dark corners of the country soon to be but a memory?

The automotive industry can answer this question.

The railroads—through high passenger and freight rates—have given their answer and it is "yes."

Can the automotive industry say "no?"

The theatrical industry offers one more field for the auto and truck to conquer. This business has not been given the study and attention it deserves from the merchandisers of trucks and cars. It offers possibilities the magnitude of which only thorough exploitation can tell.

The one-night stand company has already found that railroad charges forbid it to function in old-time style. The size of the organizations must be materially reduced or these projects abandoned entirely. For instance, the musical comedy companies must get along with a chorus of a dozen presumably all girls. The male chorus and a number of the female contingent must go into the discard. The players of all minor characters must be eliminated from the companies portraying the drama on the road.

The howl that will go up from the small communities over reduced

choruses and cut lists of characters will ultimately cause the one-night organizations to perish.

That's the situation today.

Can the automotive industry rush in while the stage is all set and play the part of the hero who arrives in the nick of time.

If the truck and the car is the most economical form of transportation here's a gilt-edged chance to prove it.

The case of the company producing "Good Morning, Judge," is perhaps typical of what is happening to touring companies in the theatrical industry. This company, with 72 people on the payroll, played to good business, and often to crowded houses, all the way from New York to Memphis, Tenn. There the company was taken off the road because it could not be made to pay. The overhead, with passenger and freight rates as the chief item, was too big to make both ends meet.

Companies starting out to tour the "provinces" today arrange the schedule so that the jumps will not be over 45 or 50 miles. Trucks for freight, omnibuses for both freight and passengers, and the larger touring cars, should be able to handle this proposition and save these

companies money.

Distributors, who can spare their own time or the time of their sales engineers, should dig into this problem at once. But don't send any greenhorns on the job. Have the facts and the figures.

The theatrical industry has the capacity to absorb thousands of trucks and cars if the economy and utility of these vehicles be rightly demonstrated.

NEW \$5,000,000 CONCERN.

The Romer Motors Corporation, capitalized at \$5,000,000, is a Massachusetts corporation with its head offices in Boston. It will manufacture motors, steam, gas and electric engines, motor trucks and cars, airplanes, motorcycles, tractors and parts. Its incorporators are Albert J. Romer of Boston, J. Ellis Nightingale of Danvers and James L. Roope of Salem.

STANDARD STEEL CAR CO. CONTROLS THE VIM TRUCK.

The Standard Steel Car Co., Pittsburgh, Pa., manufacturer of the Standard Eight car, has taken over the Vim Motor Truck Co., Philadelphia.

SIGNS OF LIFE IN THE INDUSTRY

NEW ENGLAND MACK MEN PLAN TO SELL 1500 TRUCKS IN 1921

Norman Halliday, New England district manager for the Mack truck, held a get-together meeting of the branch managers, salesmen and dealers in his territory at the Boston City Club the latter part of February and the policies of the company were outlined in an all-day session, which was attended by prominent factory officials. Mack trucks are going strong in the New England territory. During the past year 961 new Mack trucks were sold in this territory, and for 1921 the quota allotted to New England is 1500 trucks.

The different speakers told of Mack achievements in domestic service and what the Mack did during the wartime period. Other speakers went into detail on Mack construction, pointing out the distinctive features of the different models, particularly of the Model A. B. Mack, which may be had in three sizes, 1½, 2 and 2½-ton capacity.

M. C. Horine of the engineering department gave a very interesting talk on the Model A. B., which is equipped with a dual reduction axle and the entire truck is now manufactured by the Mack company in its own shops. A point of special importance brought out by Mr. Horine was the case-hardened crankshaft and gears of the Mack trucks, a feature of construction that makes the Mack loom big in the commercial vehicle field.

There was on display a set of Mack parts, including a crankshaft that had been used in a truck that had travelled 100,000 miles with no perceptible sign of wear, with less than .002 of an inch at any point. Mr. Halliday gave an inspiring talk on sales, told how personality enters into merchandising, and gave reasons why the Mack truck holds such an enviable reputation in commercial transportation.

There are 10 factory branch houses of the Mack truck in New England, and these branches carry over \$500,000 worth of Mack parts on hand at all times. Mr. Halliday stated that the Mack is backed

by a company built on sound financing, sound sales and service policies, sound manufacturing principles and sound engineering.

Among the other speakers at the meeting were C. W. Hazeltine, treasurer of the parent company; N. M. Griffin, vice president of the Mack International motor truck, in charge of national sales; A. F. Fenner, manager of New York state, northeastern division; R. C. Shropshire, branch auditor; R. A. Hauer, in charge of legislative matters, and J. J. Redlein, who specializes on the insurance end of the Mack business.

Denby Prominent in Truck Industry, Is Cabinet Choice

President Harding's cabinet will be a continuous advertisement for the Denby Motor Truck Co., Detroit, Mich., for the reason that the man whose name the organization bears will be secretary of the navy. Edwin Denby was the president of this company. He has also been vice president and director of the Federal Motor Truck Co. and treasurer of the Hupp Motor Car Co. President Harding is to be commended for going into the automotive industry to give strength to his cabinet.

COMMERCE DEALERS DINE.

During the Chicago Automobile Show the Commerce Motor Car Co. of Detroit held a special display of the 1921 models in a show room on South Michigan avenue. Many dealers from the Middle West were present to see the new line of motor trucks. On Feb. 2 a dinner was held at the Hotel Congress, at which W. E. Parker, president of the company, presided. He gave a very constructive talk and told the dealers why this light duty truck was in constant demand and announced that this company took the largest number of orders for trucks for immediate delivery of any truck manufacturer during the show period. The new line consists of trucks of 1500-2500 pounds, 3000 pounds and 4000 pounds, at prices ranging from \$1450 to \$2150 completely equipped, even to electric starting and lighting systems.

WHITE CO. HAD FINE BUSINESS YEAR; MORE TO COME

The annual report of the White company shows an operating profit after deducting all administrative expenses, but before providing for depreciation in inventories, amounting to \$3,486,704. Reduction of inventories from cost to market values amounted to \$1,193,927, leaving an operating profit of \$2,292,776. The net profit available for dividends on the capital stock was \$2,410,014. This is equivalent to \$4.82 a share.

In commenting on the operations of the company, Windsor T. White, president, stated in part:

"The gross sales for the year amounted to \$51,998,122, as compared with \$41,667,696 for 1919, an increase of 19.8 per cent. For the first nine months sales were \$42,286,593, an increase of about 45 per cent. over the corresponding period for 1919. The sales for the last quarter were \$9,711,529.

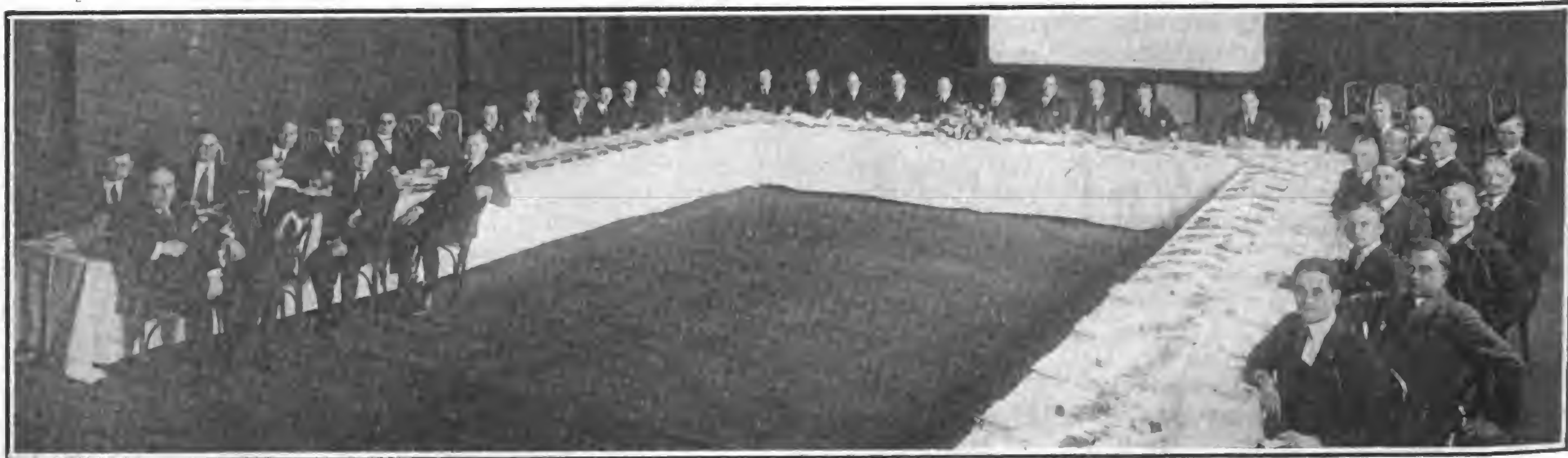
"At this time the low point in buying of the readjustment period seems to be past and the volume and diversity of orders now being received by us clearly indicate a general resumption of buying and a constantly improving business condition."

HUDSON PATENTS FOR FORD TRUCK AUXILIARIES.

The Hudson Motor Specialties Co., Philadelphia, has been granted patents on the Hudson Flexo Slip Drive and Frame Extension for the Ford worm drive truck covering mechanical features and application, dated as follows: Oct. 23, 1918; May 20, 1920; May 25, 1920; Nov. 9, 1920; Jan. 21, 1921; Canadian patent, Aug. 3, 1920.

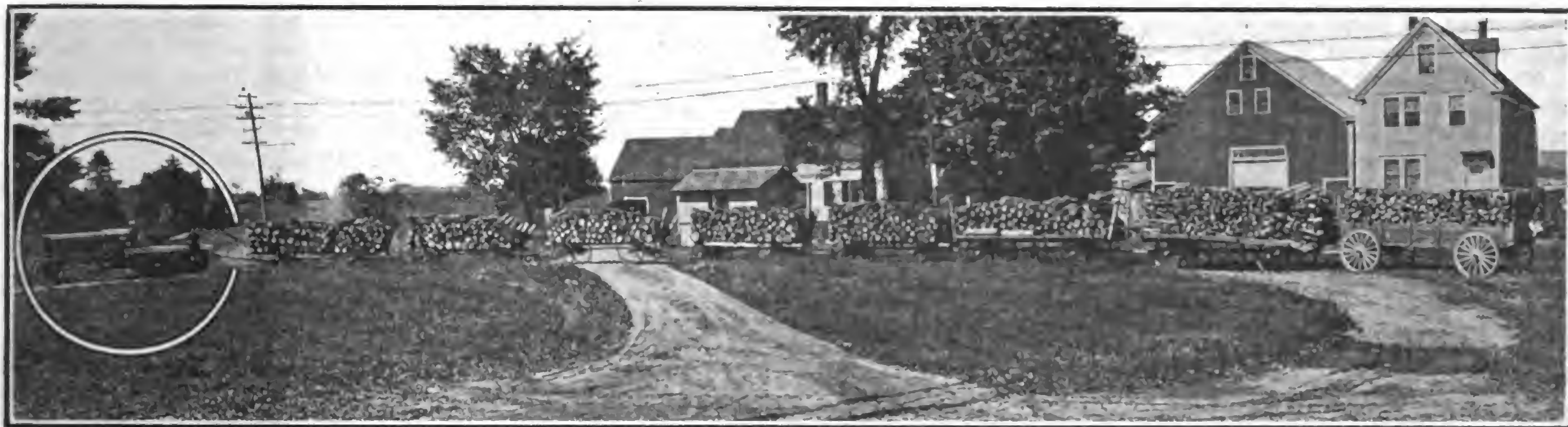
GRIND MOST CYLINDERS.

Of 179 makes of gasoline commercial vehicles, 163 have engines with ground cylinders, leaving 16 without ground cylinders. The proportion of ground cylinders is therefore 91 per cent.



President Parker and Dealers of Commerce Motor Car Co. Dining at Chicago.

THE LOMBARD AUTO TRACTOR TRUCK



Lombard Auto Tractor-Truck Hauling Eight Loaded Trailers at Six Miles Per Hour.

THE Lombard Auto Tractor-Truck Corporation, Grand Central Palace, 480 Lexington avenue, New York, is meeting with great success in the marketing of Lombard Auto-Tractor trucks for such purposes as heavy hauling work in lumbering operations and the hauling of supplies to and from ranches in the west and southwest that are located at considerable distance from railroads.

Statement is made that the Lombard Auto-Tractor truck is especially useful in a section of country far from railroads, and where good roads are an exception rather than the rule. For winter work in logging regions the tractor truck is said to be especially useful. In this case the front wheels are removed and runners substituted, making it possible for the tractor-truck to negotiate safely badly drifted and almost impassable trails or roads through the forests, hauling heavy tonnage, plowing snow paths, etc.

Instances are given where a Lombard tractor-truck equipped in this manner has been able to haul three loaded trailers, each 25 feet long and eight feet four inches wide, with sides 5½ feet high, containing loads of 25 tons each, or a total of 75 tons, hauling the load over a 12½ per cent. grade.

For hauling on bare ground, using ordinary trailers, loads varying from 20 to 40 tons are hauled over trails or almost impassable roads and taken with ease on grades varying from 12½ to 20 per cent.

The Lombard Tractor-Truck weighs 9½ tons. When doing tractor work it will carry from three to five tons on its own body and pull 30 to 50 tons behind it, this being controlled by the kind of roads and grades to be encountered, etc. As a truck on good roads the machine has a carrying capacity of a five to seven-ton truck, and in places which would be impassable for a truck and on bad roads, across fields, etc., double the load of an ordinary truck can be carried under conditions where the truck might not operate at all.

The Lombard Tractor-Truck is heavily powered by a special six-cylinder, four-stroke, T-head engine, with bore of 5½ inches and stroke of 6¾ inches, developing under N. A. C. C. rating 72.7 horsepower and on block test actually de-

veloping 148 horsepower.

The cylinders are cast in pairs from the finest close grained grey iron obtainable, fitted with unusually large water jackets which completely surround the cylinders and valves, providing a large water space around cylinder parts, which are liable to overheat in hard, difficult work. All parts of the cylinders and fittings are carefully made and fitted in such a manner that imperfections are practically an impossibility. The cylinders are first bored, then reamed, and after annealing are ground accurately to size. They are then subjected to a high water pressure to insure against the slightest leak or imperfection.

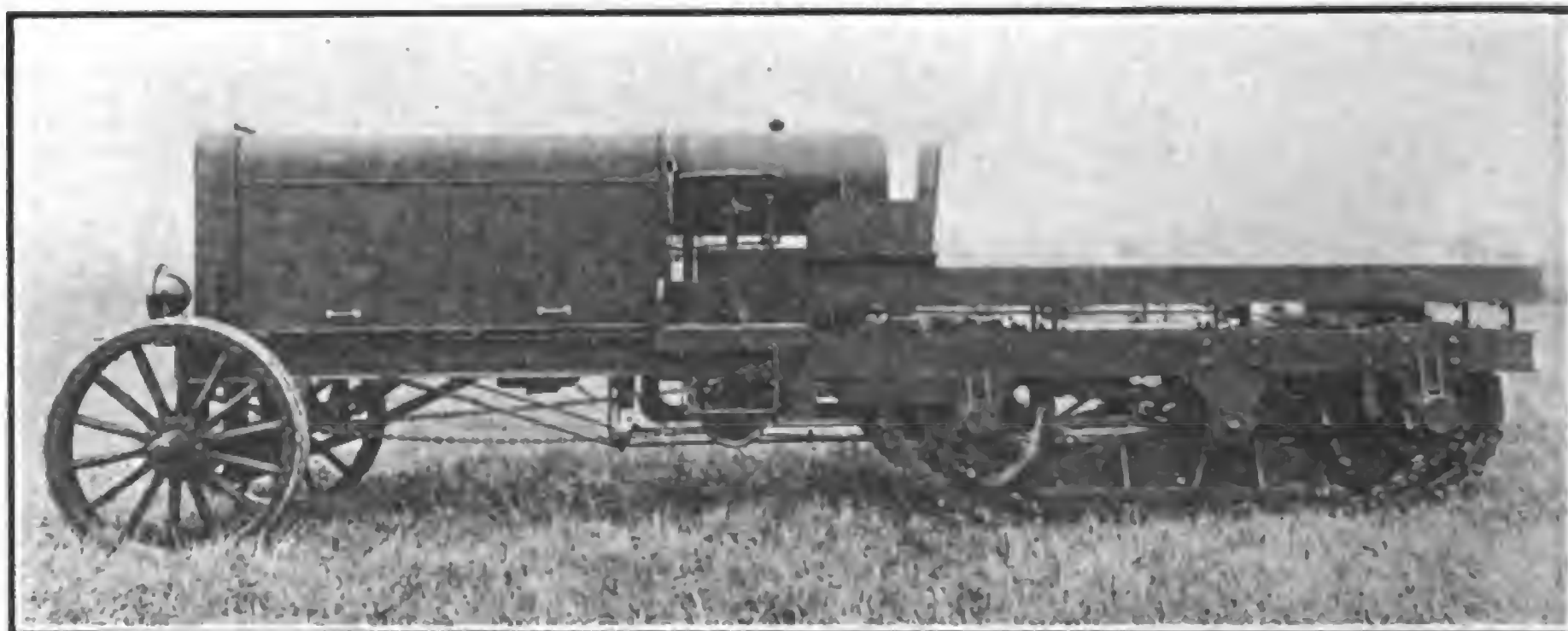
The pistons are made of the same grade of grey iron as the cylinders and given the same careful inspection for imperfections and pickled before machining. They are carefully turned, ground to exact size and are slightly tapered, being .003 less on the upper end to allow for expansion. The wrist pin lugs are provided with webs and each piston is fitted with three rings of semi-steel with four oil grooves provided below the rings, which thoroughly lubricate the walls of the cylinder and the piston. A wide groove is cut into the piston in line with the piston pin, which collects the oil and leads it into the piston pin bearing. The wrist pin is of hollow steel tubing carefully ground and hardened and is fastened to the connecting rod by means of a steel alloy bolt of two diameters.

The connecting rods are of I beam construction, drop forged from carbon steel and heat treated, are very strong and fitted with babbitt lined bronze bushings on the crankshaft end. These bearings are extra long and are adjustable by means of shims. The cap is fastened to the rod by four chrome vanadium steel bolts.

Crankshaft Is Pickled.

The crankshaft is made of chrome nickel steel, heat treated, with a tensile strength of 120,000 pounds per square inch and is carefully pickled and ground to exact size on all bearings. The fly-wheel flange is forged integral with the crankshaft and flanges are also forged integral on both sides of the rear main bearing to take up end thrust from the clutch. The camshaft is a carbon steel forging with the cams cast integral with shaft and the cams machined, heat treated and hardened, after which they are accurately ground to master cams.

The push rods are of hardened steel of large diameter and are fitted with an adjusting screw which is case hardened. The rollers and pins are made of hardened tool steel, which provide long wearing qualities to the push rod tappets. The push rod guides are of phosphor bronze and are fastened to the crank case by means of steel alloy studs and lock washers. The push rods and valve springs are entirely enclosed by an individual aluminum housing which is split in the center, being held in place by



Lombard 100 Horsepower Auto Tractor Which Carries Five to Seven Tons on Its Own Platform—Develops 130 Horsepower—Truck with Engine Running 1400 Revolutions Per Minute, Which Is Not Considered Excessive for Continuous Work.

a spring and easily disassembled when necessary.

The valves are of nickel steel or tungsten steel as desired, are of large size and easily removed when necessary.

The crankcase consists of an upper and lower half, the upper half being made of aluminum alloy casting having the cylinder blocks bolted to it and providing on its forward extension a casting integral with it which forms the timing gearset case. Massive webs inside extend through the entire depth of the case, forming a support for the crankshaft journals, providing great rigidity to the case. The journals are held in place by through bolts and are entirely independent of the lower crankcase. The timing gearset is contained in the forward extension of the case and is easily reached by removing the gearset cover. Camshafts, which are two in number, may be easily removed through the timing gearset case, as well as the idler gear and the water pump and magneto gears. The lower half of the crankcase contains the oil reservoir and is also of aluminum alloy casting. This section is securely bolted to the upper half by steel alloy studs. A drain plug is fitted on the underside of the oil reservoir, which provides means of draining the oil when necessary. Statement is made that the entire crankcase is machined with great care and is absolutely oil proof. Cast supporting cross arms are bolted to the upper case, front and rear, which position the engine in the tractor truck frame.

The timing gears are helical cut and have a very wide face and are lubricated by a duct which is bored through the idler shaft to a connection leading directly to the oil pump.

Lubrication of Engine Highly Important.

An engine for this type of heavy duty work should be provided with a very efficient oiling system and this the manufacturer has amply provided for by fitting a geared oil pump on the outside of the lower crankcase, which is driven by spiral gears from the camshaft. The oil is forced from the pump through a duct cast integral with the crankcase to branches cast in the case, to the main

bearings and camshaft bearings. From the main bearings the oil is forced through the hollow crankshaft to the connecting rod bearings, causing a film of oil to cover the bearings and crank pins at all speeds of the engine. Oil thrown out at the ends of bearings is sufficient to oil the pistons, cylinder walls and all other internal parts of the engine requiring lubrication. A fine wire gauze strainer is fitted to the opening of the oil pump, preventing grit and sand from getting into the engine bearings.

Cooling is accomplished by means of a centrifugal power driven water pump and a special honeycomb radiator of the company's make, while a large four-blade fan, driven by a three-inch flat belt facilitates the cooling of the water in the radiator.

Ignition for the engine is supplied from two sources and if one fails the other may be used till repairs can be made, or in difficult hauling, both systems may be employed to good advantage. A high tension magneto supplies the ignition for all ordinary purposes, while a storage battery supplied with current from a power driven generator acts as the second or reserve system when needed, and also supplies current for the lights and for the starting motor which is included in the engine equipment.

The carburetor is a Stromberg, which is noted for its pulling ability and economy, while the fuel is fed by pressure from the main tank at the right of the operator.

The clutch is a multiple dry disc type of large size and very smooth in action. The heaviest loads may be started without grabbing or jerking.

The gearset is located amidship, is of special design for heavy duty work and is equipped with three speeds forward and one reverse.

All gears are of large size, having unusually wide faces and operate on shafts equipped with anti-friction bearings. Power from the gearset is delivered through a universal joint to a propeller shaft which extends to a second universal joint where the power is delivered to the worm and worm wheel to the differential and axles of the axle system

and is transmitted through the axles to the driving wheels inside of the treads. Traction is by means of long steel shod treads which are capable of traveling over rough or soft ground with the same ease as on well surfaced roads. Special treads may be supplied for travel over macadam or city streets which will not impair the street surface.

The chassis, as stated, weighs 18,000 pounds, and the per cent. of weight on the rear treads is put at 90 per cent.

The speed of the average tractor with load is claimed to be from two to 2½ miles per hour, while the Lombard is guaranteed to have a road speed of six miles per hour with load, and in numerous tests a continuous road speed of eight miles per hour with 31 tons back of the machine has been attained.

GOOD ROADS BENEFIT FARMER.

Nobody in the world is more interested than the farmer in good roads. With him it is largely a business proposition. Yet most of the agitation for improved highways comes from owners of pleasure cars.

Good roads mean to the farmer greater income, less cost of operation, wider scope of operation, saving of time in getting supplies to the farm and in getting products to market, independence of weather conditions, more or less independence of railroad transportation, more or less saving in cost of railroad transportation, saving in repairs on trucks, wagons and harness broken on bad roads.

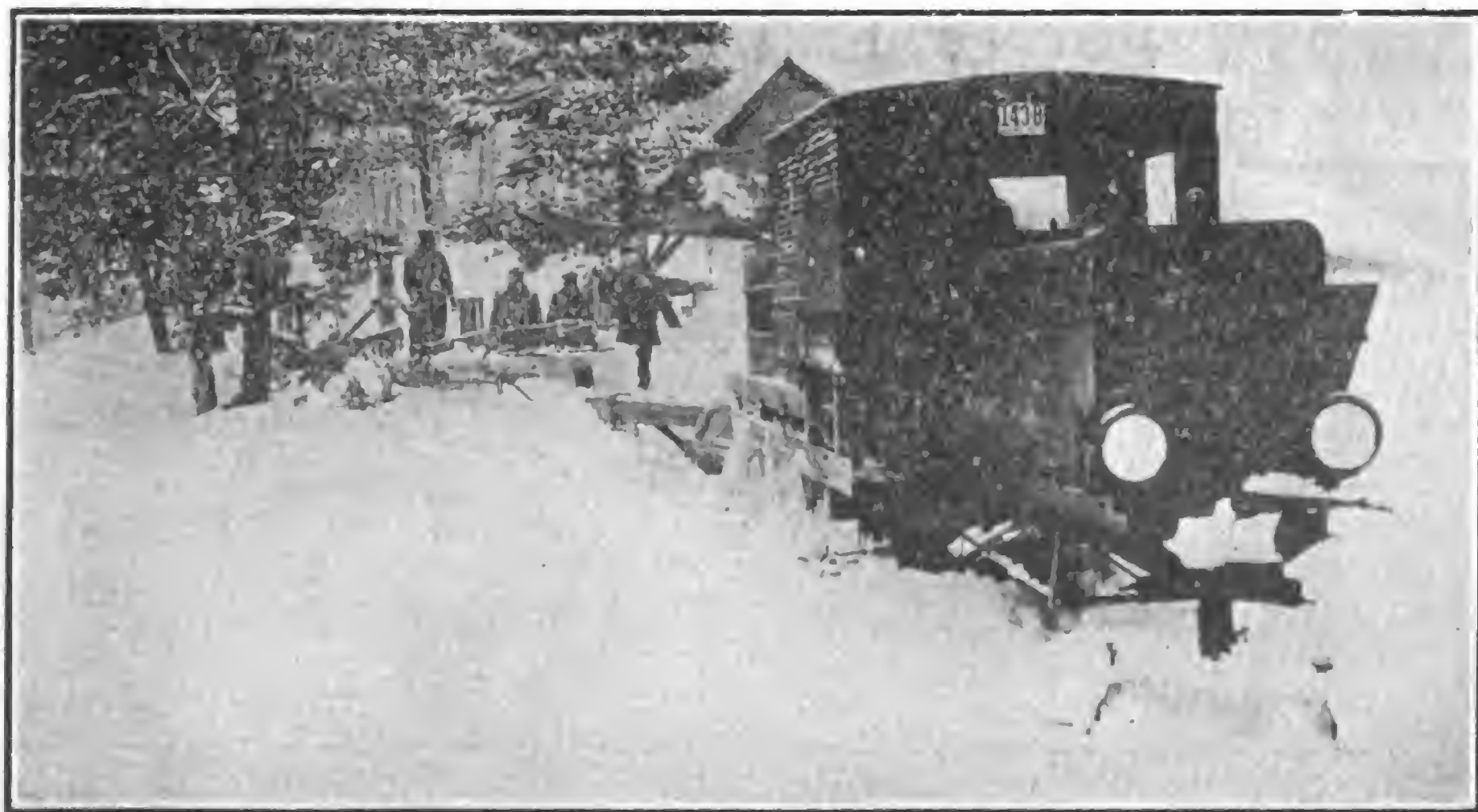
A big road building programme will benefit and bring better prices for what the farmer produces. With labor fully employed the demand for the farmer's products is at its maximum. With millions out of work demand slackens and prices recede. From this standpoint also it is to the farmer's interest to push hard to get the road building programmes under way as soon as possible.

MIDWEST ENGINES AT SHOW.

The Midwest Engine Co., Indianapolis, Ind., displayed a complete line of truck and tractor engines, together with the Midwest Utilitor, at the national tractor show at Columbus. These products attracted much attention and won strong commendation. The Utilitor is being nationally distributed in bulk. Midwest engines are used on the Allis-Chalmers, Lauson, Bates Steel Mule, Dill and Huber Super-Four tractors.

TRUCKS AT KANSAS CITY SHOW.

The truck section at the Kansas City show last month was a result getter. There was no crowding and every article counted. Trucks already sold, with the name of the purchaser, was a feature that spoke louder than words. There was worth-while business for both the wholesaler and retailer at this show. The truck business is coming strong in Kansas City.



Plowing Snow Paths with Lombard Auto Tractor-Truck Around Saw Mill in Logging Regions of Maine.

Boston Show Will Be Get-Together For Automotive Industry

Manufacturers, Distributors, Dealers, Salesmen and Engineers Will Be Present to Measure the Demand for Motor Power—Atmosphere at Big New England Exhibit to Determine Future Production Schedules.

ON THE eve of the 19th Annual Boston Automobile Show, staged in Mechanics' building, March 12-19, the arrow points not only to one of the finest exhibitions ever held anywhere, but also one of the greatest get together gatherings in the life of the industry.

A host of factory heads, the majority of sales managers, and engineering chiefs in great number will be present. The manufacturers will attend to get a first hand peep into the market situation. They will study the signs and, in addition to what may appear on the surface, will read between the lines and base their plans for future production on what their acumen and judgment tells them the show reveals as to public demand for their wares.

Many in the know predict that the production pace to be maintained from now on will depend mainly on the conditions of the market as disclosed at the Boston show. An attendance of at least 200,000 is counted on and the buying disposition and the interest shown by this large number is figured to be the barometer which will guide future operations.

"Indications are that more agents of motor cars, trucks and accessories will come to the Boston show than ever before," says Manager Chester I. Campbell. "This abnormal attendance of those vitally interested is due to the desire to get the real business conditions of the industry."

Many Dealers' Meetings.

Distributors and dealers will also round up their selling forces for the show. There will be meetings of the various distributing organizations and all out-of-town representatives will be on hand to imbibe the stirring atmosphere

which this show always imparts. Dealers and salesmen will be fired anew for their task through the presence of the great crowds, a certain indication that the motor vehicle has lost none of its popularity and carries the same appeal as of yore.

There is no freight transportation tie up this year and there will not be a vacant space in the exhibition area. There will be 350 passenger car models on display, 87 makes. Also will be 236 truck models of 57 different makes. The motor accessory exhibits number 358. More than 100 prospective exhibitors were denied an opportunity to exhibit their products because of lack of space.

There are many indications that the Boston exhibition will lead all shows of the year as a buying event, as well as in many other lines. Industrially New England is setting a pace for the rest of the country and this fact should prove potent for both the truck and car merchandiser. New England has long been a rich field for these units and will so continue.

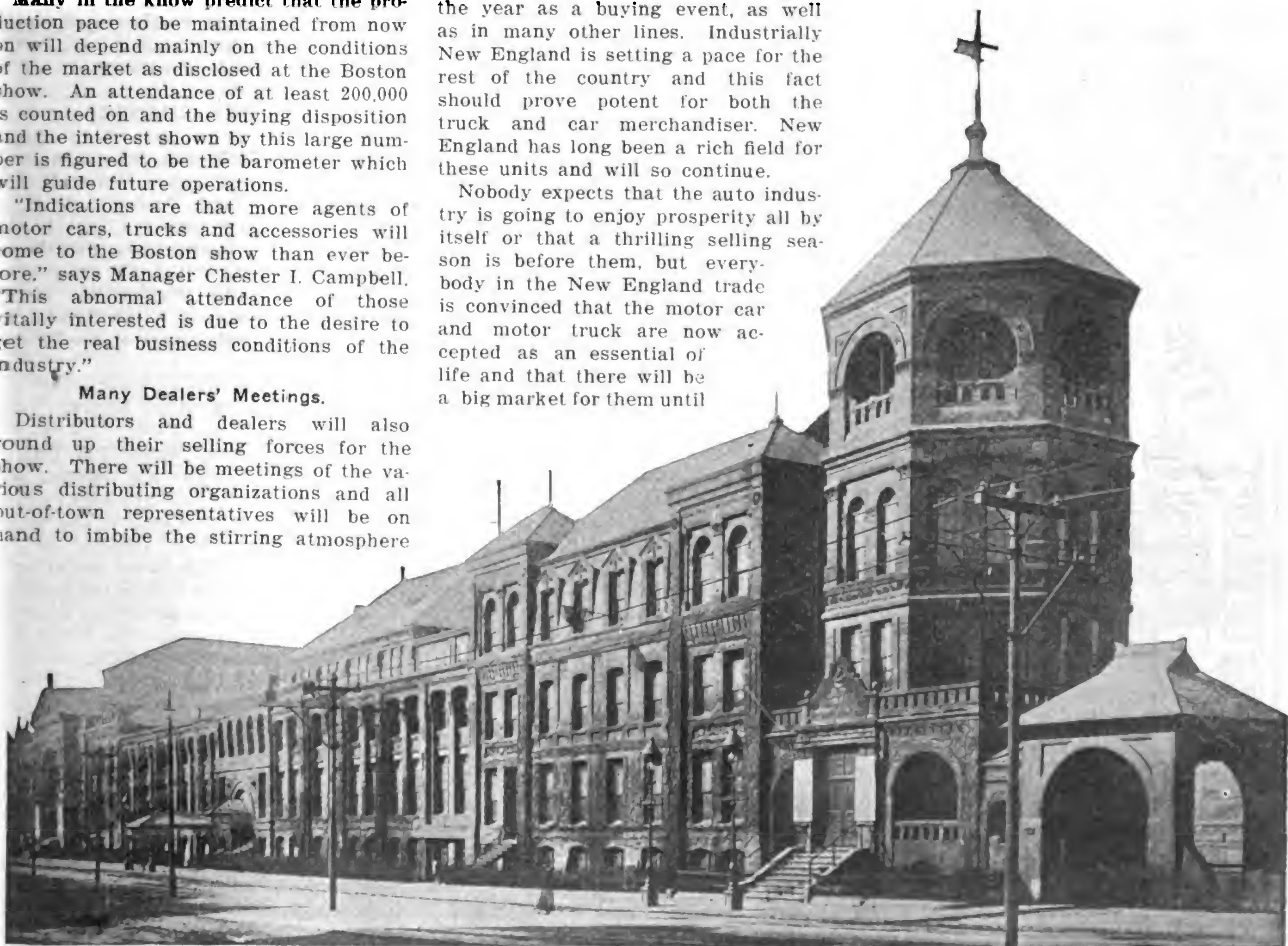
Nobody expects that the auto industry is going to enjoy prosperity all by itself or that a thrilling selling season is before them, but everybody in the New England trade is convinced that the motor car and motor truck are now accepted as an essential of life and that there will be a big market for them until

some better mode of personal and merchandise transportation is devised.

The year 1921 will be a transportation year, it is pointed out. Every business and every product is called upon to face its part in reconstruction. Efficient methods must prevail. People must have cars and trucks.

A Record Truck Display.

Mechanics' building, the scene of the show, has 105,000 square feet of exhibition space, being the largest exposition building in New England. The truck display will be in the basement and will be by far the largest truck showing of the year. Every known truck equipment and accessory for the power hauler will be in evidence. There will also be elec-



Huntington Avenue Front of Mechanics' Building Looking South, Where Boston Automobile Show Is Held.

tric trucks, trailers, semi-trailers and tractors on view.

The accessory department will be a place of wonder for the man who owns a car. There will be hundreds and hundreds of devices that will appeal to the motorist. Some of these will even be a year in advance of the standard equipment to be noted on the new cars.

There will be a huge army of new things to be seen and the dealer can get more information as to the trend of affairs in an hour at the Boston show than he can at home in a month.

It will cost close on to \$100,000 to open the doors of Mechanic's building upon the automobile show. From far-off Japan and many European countries has come material to be used in the decorations.

The richest colors in royal purples, dull golds, green lacquers, deep wines and other shades intensified thousands of multi-colored electric lights and electroliers make the most gorgeous background for the Boston Automobile Show that has ever been attempted. It will be one mass of color and will be in perfect harmony with the gay coloring of the handsome 1921 models.

The decorations in the grand hall of the huge exposition building will be strikingly beautiful. The stage will have a facade in glass and marble, brilliantly illuminated. Beyond will be seen beautifully colored landscape effects, giving a perspective restful as well as colorful.

Show at Copley-Plaza.

In addition to the show at Mechanics' building there will be a special salon exhibit at the Copley-Plaza hotel. This is held also in connection with the regular show and under the auspices of the Boston Automobile Dealers' Association.

At the hotel there will be exhibited a line of closed cars sold by the Boston

dealers mostly in the higher priced models. It will take up the entire ballroom and will be on a par with similar shows held at New York and Chicago.

Many of the foreign cars that have not been marketed since the world war will be on exhibition at the salon. The Mercedes, Fiat, Rolls-Royce and Sunbeam are some of the foreign cars exhibited. The limousines with their beautiful imported tapestries, silver and gold mountings, beveled glass windows, selling up to \$15,000, will be included in this exhibit. There will also be some medium priced closed cars in the salon, which will be the most extensive exhibit of this kind ever held in Boston.

Manager Campbell's Views.

In speaking of the outlook for this year Manager Campbell said:

"People will want cars in 1921, for efficient methods must prevail. But they will not ask as in years gone by: How about speed? How about comfort? How about prestige? The acid test will be: How much economy in transportation? How much gain to my business?"

"These are the questions which the automobile salesman at the show can answer with satisfaction to the sternest interrogator. In a year when efficiency in transportation will be essential, the passenger car and truck will have an opportunity to prove their worth to a degree not realized in the times of superprosperity.

"We may or may not see the volume of orders which piled up in the first half of 1921. That period represented the demand of a market which had been starved for two years, plus the immediate requirements of the day. On the other hand each succeeding year brings greater need for hauling of goods and passengers from point, greater econo-

mies in time.

"We know that fundamental business conditions are sound. We know that the automobile is one of the primary transportation units. We know that the owner realizes to an increasing degree that the possession of a car is an extension of his power in business, as well as a widener of his social contacts."

The show is open day and evening.

HUNN HEADS KELLY AGENCY.

The Enterprise Motor Corporation, New York City, handling the Kelly-Springfield truck, one of Hare's Motors products, has undergone some executive changes. E. Hunn, Jr., assistant to President E. H. Hare, has been made general manager of the Enterprise firm, which includes a sales and service station in New York and a branch in Brooklyn. The general sales manager is George S. Hauck, and E. H. Dorman is service manager.

PARTS SERVICE STATIONS.

Representatives of the Motor Truck Manufacturers' association and parts and unit makers met Feb. 24 at Chicago to discuss the question of service and distributing stations which the manufacturers of parts and units have been establishing through the country and which the truck manufacturers feel directly affects the business of the truck dealer. No agreement was reached and further conferences will be necessary.

TIMKEN CHANGES.

George C. McMullen, who has represented both the Timken Roller Bearing Co. and the Timken-Detroit Axle Co. in the Pacific coast territory for the last three years, is to give his entire time to sales engineering in the sole interests of the Timken Roller Bearing Co. McMullen's former assistant, C. H. Brooks, will take care of the business of the Timken-Detroit Axle Co.

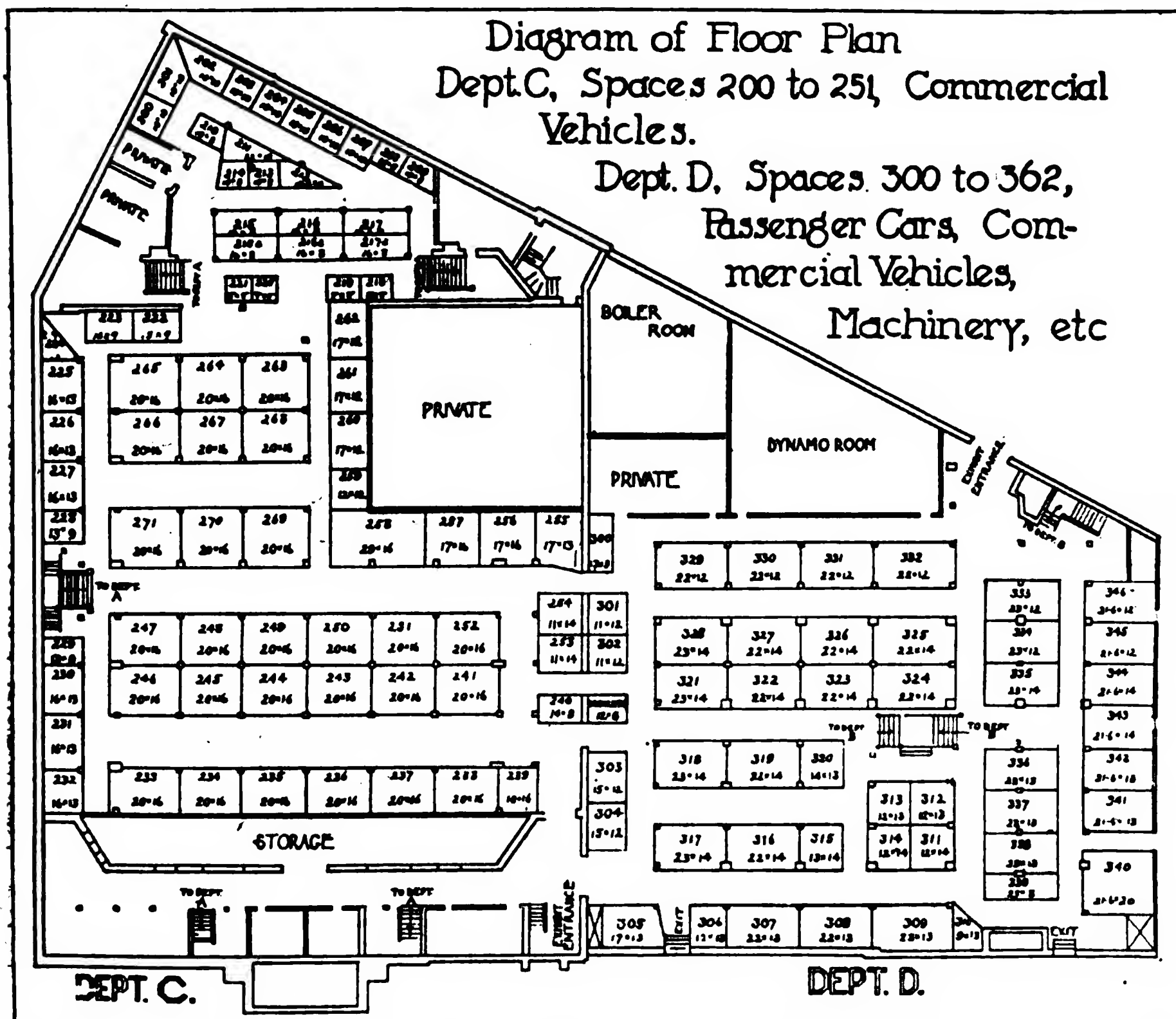
PAIGE DETROIT BUSY.

The Paige-Detroit Motor Car Co., Detroit, intends to have all its men back and working on a 100 per cent. production schedule by the end of the month.

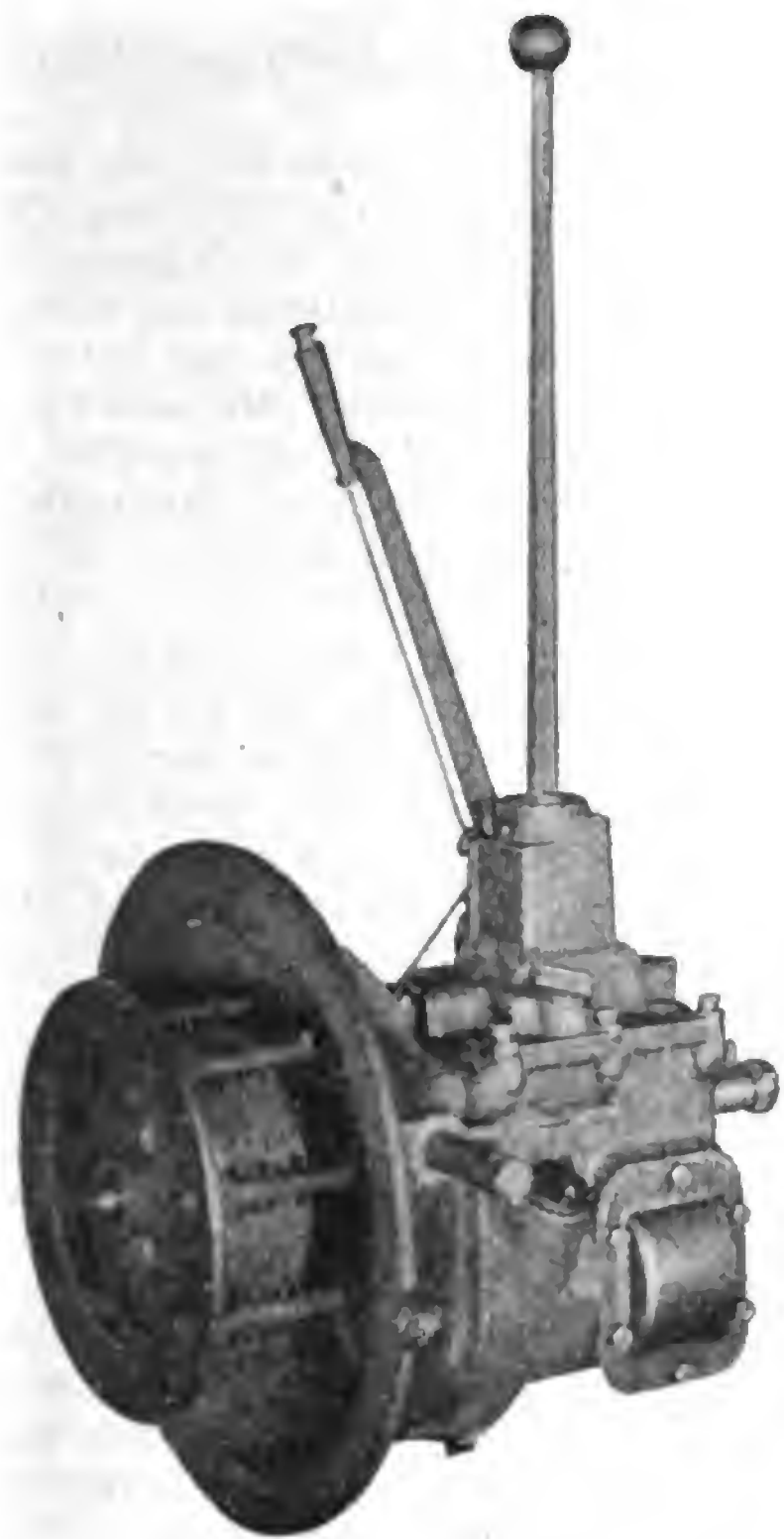
"Every automobile factory in the United States will again be operating on a 100 per cent. basis before the month of April is over," states President Jewett.

THE AJAX TRUCK.

The Ajax motor truck, which is to be exhibited by the Ajax Motors Corporation, 15 State street, Boston, for the first time at the Boston show, was designed by Col. Arthur J. Slade: Member National Institute of Inventors, member Society of Mechanical Engineers, associate American Institute Electrical Engineers, and formerly chief engineer of the Motor Transport Corps of the A. E. F., where he had charge of the designing and construction of all trucks used in the aviation service by the government.



POWER TAKE-OFF WIDENS TRUCK RANGE



Removable Plate Covers Power Take-Off Opening on Side of Gearset, Four Speed and Reverse Selective Type.

THE uses that can be made of the transmission power take-off have never been properly presented to the readers of MOTOR TRUCK. This unit has been mainly used with dump bodies where the hauling was confined to coal, gravel, stone and other heavy duty work of a like nature, the device being employed as a means of supplying the necessary power to raise and lower the body when dumping the load.

In farming operations the power take-off has many uses not previously recognized. For instance, by fitting an extended shaft to the rear of the truck frame on the underside and fitting a pulley at the end it is a simple matter to belt from the pulley to such implements as a wood saw, feed grinder, corn sheller, or to the silo filler. The power take-off is driven at engine speed and the reduction in power output is small, so that sufficient power is developed at the pulley to supply the needs of the average farmer for driving the various farm implements requiring power.

Fuller & Sons Manufacturing Co., Kalamazoo, Mich., has perfected a power take-off device which is easily attached to the transmission of any truck equipped with power take-off plate on the side of the transmission case. The device is attached by simply removing the plate and fitting in its place the power take-off, which consists of a spur gear keyed to a short shaft which has a bearing in the case at each end and is fitted with a connection allowing the spur gear to be thrown into mesh with the gear of the transmission, the lever extending to

the side in a convenient position easily reached with the hand.

Used to Operate a Winch.

Still further use may be made of this device to operate a winch. This is a very useful equipment for loading heavy freight that possibly may have to be dragged some distance before it can be hauled into the truck. This device will prove very handy when loading dead animals into the truck when hauling them to a rendering plant. The rope in this case is wound around the slowly revolving drum and the heavy freight is slowly drawn into the truck body over the drop end gate of the truck.

Still another use for the winch, which is utilized to a great extent in the corn belt is that of loading shocks of corn from the field onto the truck. The truck operator drives along side of the shock, the truck being equipped with a crane fitted to the side of the truck body and having a rope passing through pulleys at the top and end of the crane, the lower end of the rope passing around the winch drum. After the rope is made fast to the top of the shock of corn the shock is easily raised from the ground, the crane turned and the shock loaded on the truck.

Claim is made that the power take-off applied to a winch is sufficient to operate one of the smaller sizes of winch and exert a pull equal to one ton. This power is available by the use of the winch in pulling machinery out of soft spots and with a combination of the block and tackle can even be used to good advantage in pulling stumps. The winch may also be used for operating hay forks, stretching cables, loading logs and numerous other useful jobs about the farm.

Widens Truck Range.

There is a probability that truck manufacturers in the future will see the advisability of constructing special trucks that may be used in connection with the power take-off device for such purposes, as well as drilling and post hole digging. These machines at the present time employ a stationary engine, either gasoline or steam, for power, and also use heavy equipment. The use of an ordinary $3\frac{1}{2}$ or five-ton truck equipped with power take-off will materially lessen the weight of such a machine and make it practical at low cost for the farmer to purchase. Development along this line is being watched by the farmers in general and its adoption will no doubt be eagerly received.

With business conditions as they are, it appears that the big potential market for motor trucks is the farmers' market. So that anything that can be added which will be of real service to the farmer is well worth considering.

Many truck manufacturers do not appreciate to how great an extent the power take-off can be adapted to widen the range of the motor truck.

That manufacturers are beginning to realize this is shown by the fact that a year ago the power take-off was practically unknown, and that now practically all of the best designs of motor trucks of the heavy duty type have provisions on the transmission for utilizing the power of engine for separate purposes.

BOSCH EARNINGS.

American Bosch Magneto Corporation reports net profits for 1920 of \$945,700, which is equal to \$9.45 a share on the 100,000 shares of capital stock outstanding. In 1919 net profits were \$921,963, equal to \$9.21 a share, but in that year it was not forced to write off anything for inventory adjustment. Inventories at close to 1920 were carried at \$4,344,727, compared with \$2,928,582 at end of 1919.

KOETHER DIRECTS HYATT SALES.

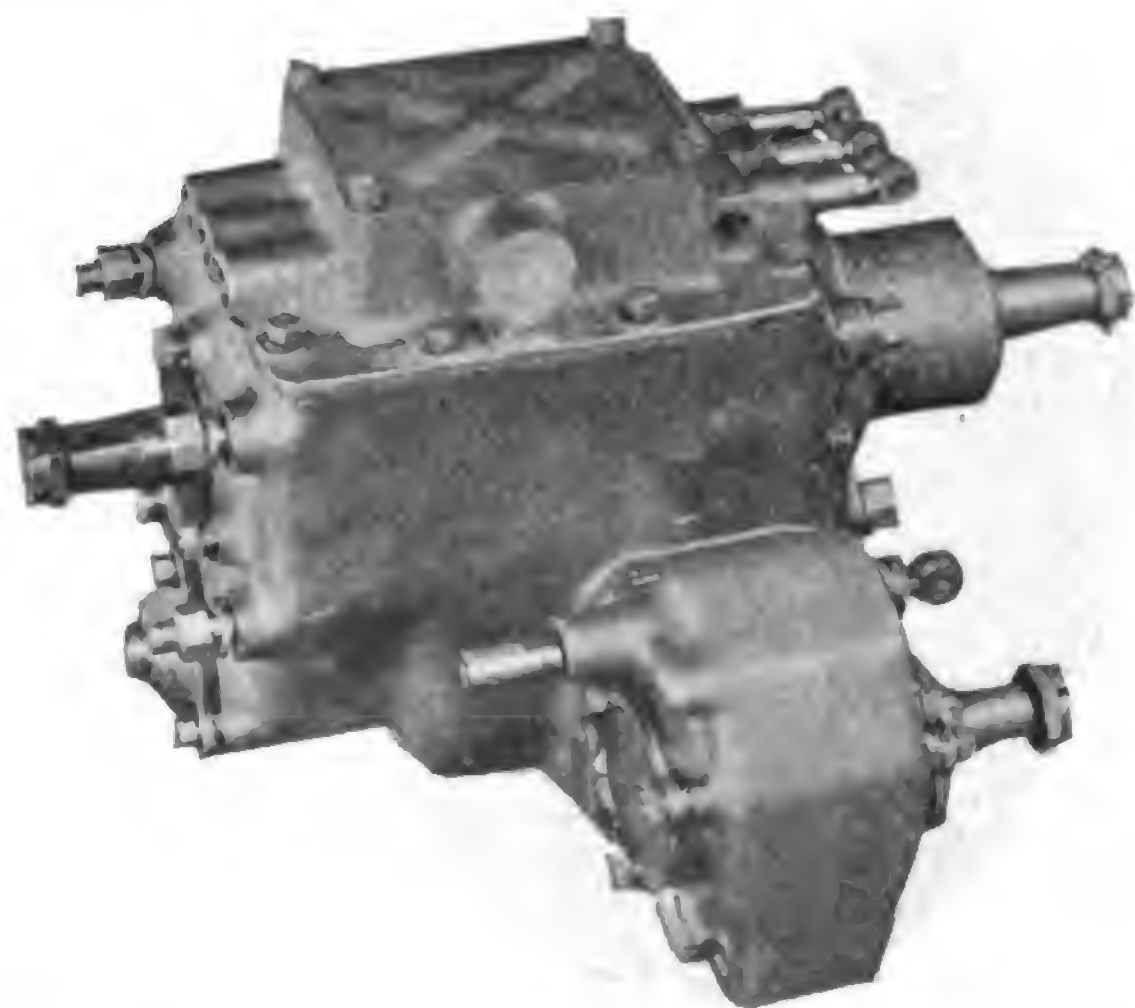
Vice President B. G. Koether, who has been acting as assistant general manager of the Hyatt division of the General Motors Corporation, has resumed charge of sales for the Hyatt Roller Bearing Co., Harrison, N. J., following the resignation of Vice President C. M. Eason, who has accepted an important post with the Samson Tractor Co., Janesville, Wis.

PIERCE-ARROW DIVIDEND.

Pierce-Arrow Motor Car Co. has declared a quarterly dividend of \$2 a share on preferred stock, payable April 1.

TRUCKS AT BROOKLYN SHOW.

There was a splendid showing of motor trucks at the Brooklyn, N. Y., Auto Show held March 5-12, at the 23 Regiment Armory, Bedford and Atlantic avenues, in charge of the Motor Vehicle Dealers' association.



Power Take-Off Attached to Transmission Gearset, Four Speed and Reverse Selective Type.

OLD TIMERS STANDS FOR ALL THAT'S GOOD

Headquarters of the Old Timers' club have been opened at 420 Book building, Detroit, occupying a portion of the offices of F. Ed. Spooner, who is secretary and general manager of the organization. The Old Timers' club was started at the 1920 automobile shows and grew during 1920 to a body of 6000 members without officers and with no set policy. At the first annual banquet held in the Gold Room of the Congress hotel, Chicago, Tuesday, Feb. 1, every available seat, 625 in all, was occupied. Congressman Clifford Ireland of Illinois was the toastmaster and the speakers included Elwood Haynes, who was made honorary member number one; David Beecroft, directing editor of the Class Journal Co.; Albert Champion, newly elected president; Forrest J. Alvin of the U. S. Motor Truck Co., Cincinnati, and Samuel E. Hibbin of Chicago.

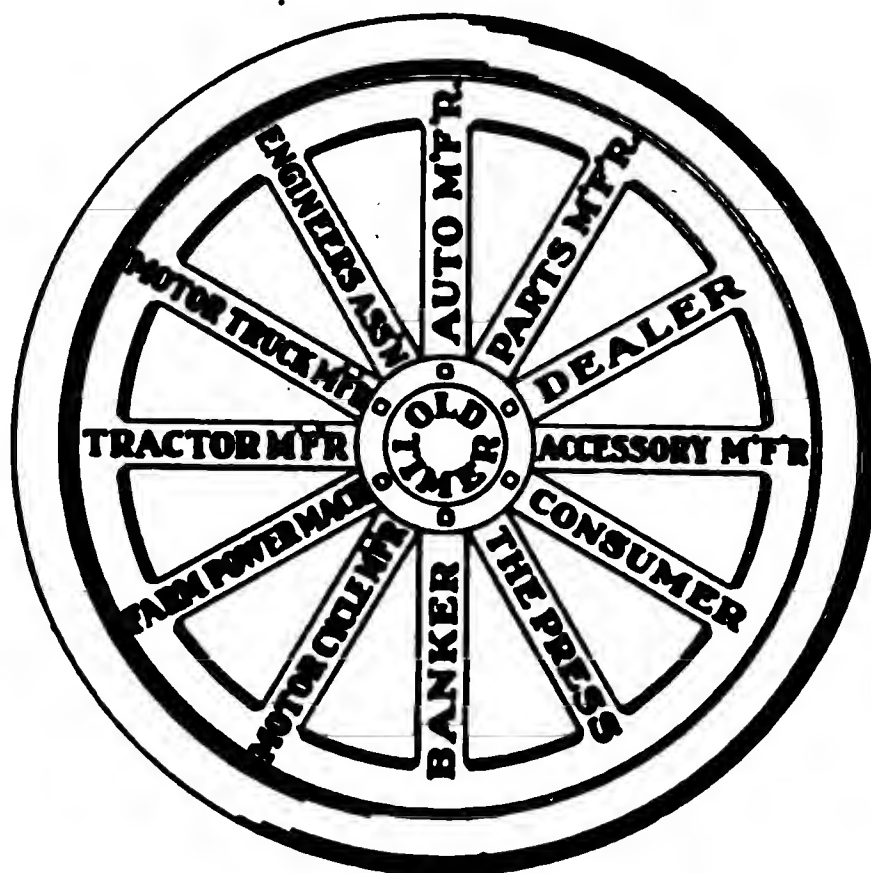
Officers for the ensuing year include: President, Albert Champion, Champion Ignition Co., Flint; secretary, F. Ed. Spooner; vice presidents, passenger car and airplane section, Howard Marmon, Nordyke & Marmon Co., Indianapolis; motor truck and motor tractor section, Martin L. Pulcher, Federal Motor Truck Co., Detroit; parts and accessories section, John Younger, Standard Parts Co., Cleveland; jobbers' section, Gregory Flynn, Edward A. Cassidy Co., New York; distributors' section, W. L. Hughson, San Francisco; dealers' section, Thomas J. Hay, Chicago.

The Old Timers' club stands for good fellowship, good laws and good roads.

Old Timer Emblem Suggested.

Forrest J. Alvin, general manager of the United States Motor Truck Co., Cincinnati, O., is the originator of a clever device which has been sent to the officials of the club as a suggestion for an emblem.

The design, as will be noted from the



accompanying reproduction, is in the form of a wheel with "Old Timer" as the hub. The 12 spokes are represented as 12 important factors in the automotive industry, as follows: Engineers' association, Motor Truck Manufacturer, Farm Power Machinery, Motorcycle Manufacturer, Banker, The Press, Consumer, Accessory Manufacturer, Dealer, Parts Manufacturer, Automobile Manufacturer and Tractor Manufacturer.

OWNER-DRIVER DERIVES A SUBSTANTIAL LIVING FROM SINGLE TRUCK

Fred B. Oakes, 400 Fruit Hill avenue, North Providence, owns and drives a two-ton Federal truck which has returned him a substantial living during the seven months that he has held this piece of property. Mr. Oakes knows what he is talking about because he keeps cost records "and everything."

He is not one of the single-truck owners who go along thinking that they are making money when they are actually losing. In addition to getting a comfortable livelihood and paying for gasoline, oil and other operating essentials, Mr. Oakes is paying for his truck monthly and is putting enough money away to cover depreciation, this nest egg to go toward a new truck when his first purchase begins to "miss."

The North Providence man bought his truck with the idea that he could get enough work from hauling for the worsted mills in Centredale to keep his machine moving. The textile business has been in the dumps ever since he started trucking. In seven months he has done just one mill job.

Mr. Oakes is young and energetic. This condition did not phase him for a minute. He began to rustle up work and does not know what it is to have an idle day.

This particular commercial hauler has been fortunate in securing lasting jobs. Of his seven months in the business he put in two hauling brick, lime, lumber and other building materials for the O. D. Pennington Co., Providence contract-

ors. He hauled several weeks at a stretch for the Hovey Lumber Co. of Providence.

He put in two weeks for the Rhode Island National Guard at \$25 a day. This contract ran during the encampment period, his work consisting of bringing supplies from Newport to the troops at Forts Getty and Greble. He also hauled troops to Bristol, R. I., during the riots of a few months back at the plant of the United States Rubber Co. in that town.

This month the Oakes truck spent most of its time in the service of the B. H. Gladding Co., department store, Providence. This concern has been remodeling its place of business and one of the chief jobs of the Federal was to bring the contents of six cars of fixtures from the freight yards to the store.

The Oakes truck is equipped with a high stake body which meets the requirements of most of his work. The owner did one furniture job. One article was damaged and after he had paid for this and figured his costs he realized that he had worked for less than nothing. He then and there retired from the furniture moving field, resigning this work to truckers better equipped for this class of transportation. He usually charges by the hour or day, seldom by the job. His normal charge is \$2.25 an hour.

Mr. Oakes has no set method of getting business. He just keeps his eyes and ears open and his nose to the ground.

TRUCKS CLEAR MARYLAND ROADS.

Maryland's motor fleet of 25' trucks equipped with snow plows, opened up every mile of road in the state after the big storm of Feb. 21.

Grant Motor Car Corporation announces that it has discontinued the building of trucks.



Forrest J. Alvin, General Manager, U. S. Motor Truck Co., Cincinnati, O.



Martin L. Pulcher, Federal Motor Truck Co., Detroit, Mich.

NEW RUMELY 1½-TON FARM TRUCK

A TRUCK which created unusual interest at the Sixth National Tractor Show held at Columbus, O., last month, was the new Rumely 1½-ton farm truck, the latest product of the Advance-Rumely Thresher Co., Inc., La Porte, Ind.

The new Rumely 1½-ton capacity truck has been especially designed for the farming trade of the West, follows conventional structural lines and uses units of well known construction that have passed beyond the experimental stage and have been accepted as standard by the trade. No effort has been spared to uphold through this unit the Advance Rumely Thresher Co.'s recognized policy of using nothing but the best in the construction of the various farming machines it manufactures.

Many favorable comments were heard at the National Tractor Show from distributors, dealers and farmers in general at the first showing of this new truck.

Powered by Buda Engine.

The power plant of the new Rumely Farm Truck is a Buda model CTU unit construction engine, four-cylinder, four-cycle, heavy duty type, with the cylinders cast en bloc, having a bore of 3¼ inches and stroke of 5¼ inches, with an S. A. E. rating of 22½ horsepower.

The Buda CTU engine is stated to be especially adapted to the so-called speed type of truck of 1½ tons capacity. The speed truck has been found especially useful for hauling produce, live stock and other farm products to city markets, where the markets are located at a considerable distance from the farm and speed and time are two very important factors in the haulage problem.

All units of the Buda CTU engine are of ample size for the work, are carefully made from selected steels, case hardened and ground to accurate size, before assembling in the engine. Such units as the cylinders, crankcase, removable head, flywheel housing, etc., are made from semi-steel or gray iron, carefully machined and fitted with great care, giving an engine which has great power, unusual wearing qualities and sufficient speed to handle quick deliveries, with maximum economy in operation.

Ignition is supplied by a Splitdorf high-tension magneto and carburetion by means of a Stromberg carburetor. A Pierce governor is attached to the intake manifold, governing the speed on solid tires at 15 miles an hour and on pneumatics at 25 miles an hour. The governor is set correctly at the factory and should not be changed, if the purchaser wishes to get the benefit of the manufacturer's guarantee.

Cooling of the Engine.

Cooling of the engine is accomplished by means of a centrifugal water pump, power driven from the engine timing gearset, which forces the water through the large sized water jackets of the engine cylinders and head, thoroughly cooling the cylinders and the valves. A large,

four-bladed fan mounted in the rear of the radiator, shroud enclosed, driven by a wide, flat belt from the fan pulley on the engine, completely cools the water in the radiator as it flows from top to bottom.

The radiator is a flat tube type, claimed to be superior to the round type, as the possibility of water freezing in the tubes is greatly reduced. The radiator has a large cooling capacity and is built unusually rugged to withstand abuse. Five sections form the radiator, the core, top and bottom tanks and the two sides. The shell is formed of the top and bottom tanks, bolted to the sides and encloses the core, amply protecting it from damage. The engine is hung in the truck frame at three points, forming a three-point suspension. Two arms at the rear form the rear support and a single point in front operating on a swivel, which frees the engine from the torsional strains of the truck frame, forms the third.

Lubrication of the Buda CTU engine is supplied by pressure from a power driven geared pump located in the lower engine crankcase oil reservoir, the oil being forced through cast ducts in the upper section of the crankcase to the main journals and the camshaft bearings. Oil from the main journals is forced through drilled ducts in the crankcase to the connecting rod bearings, and thrown off by the motion of the rods, oiling all interior parts of the engine, including the valve mechanism, which is enclosed. The oil works through these parts in the form of a spray or mist, thoroughly lubricating all units.

The clutch is of the dry multiple disc type and has a remarkably smooth and gentle engagement, permitting the load to be started easily and minimizes jerks or jars on the driving gears. This feature, in connection with the extra friction surface, makes a long-lived and dependable clutch.

The transmission is made unusually heavy to take care of the hard farm work. Shafts are of alloy steel carefully heat treated. Gears have unusually wide faces and the entire transmission is constructed in a unit with the engine. This eliminates any chance of misalignment of gears or shafts.

Units of Truck Carefully Chosen.

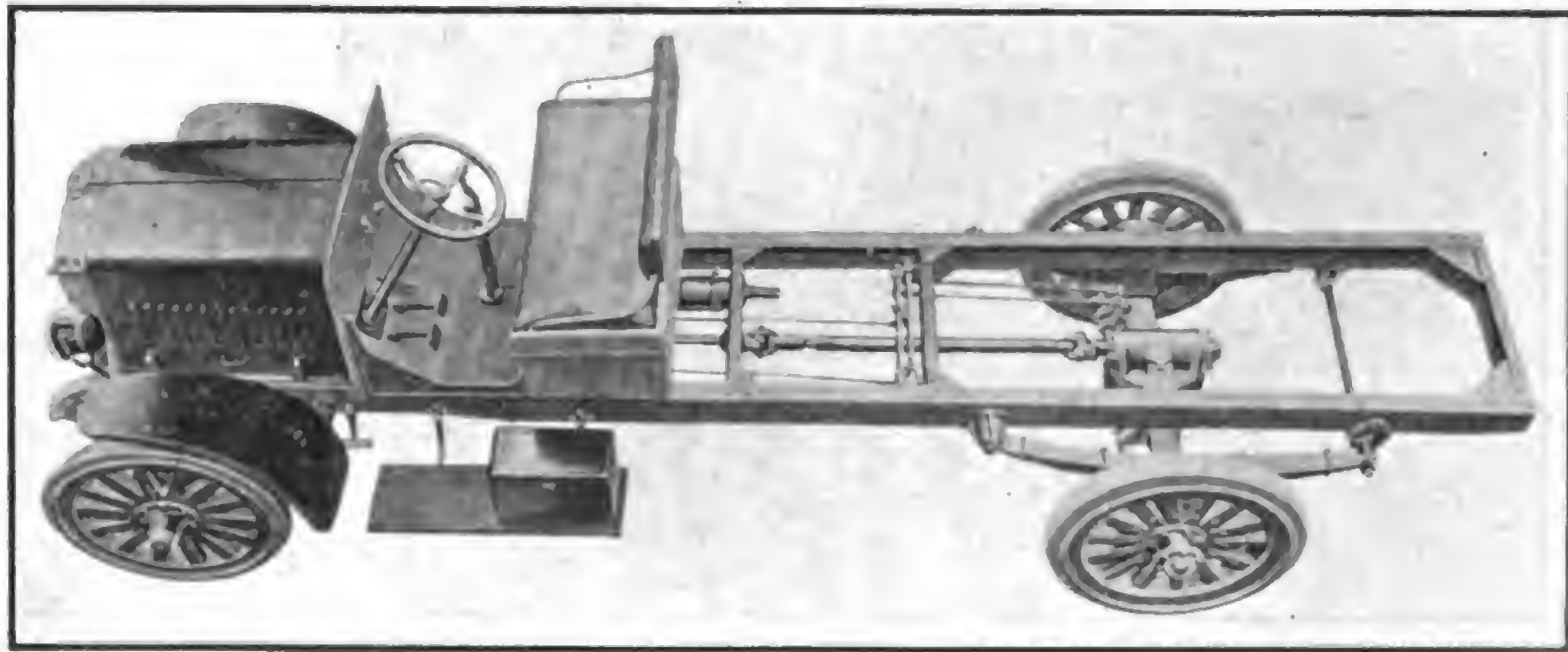
The clutch and transmission units have been chosen for their great strength, accessibility and adaptability. The clutch housing is provided with a plate, which is bolted to the case with steel studs, which, when removed, allows access to the clutch for adjusting or inspection. The transmission, of Fuller manufacture, is separated from the clutch housing by a partition which prevents the oil from the transmission gearset from working into the clutch housing and damaging the friction surfaces of the clutch. The gears of the transmission are of large size, having deep cut teeth, with the main and counter shafts mounted on anti-friction bearings. A power take-off is provided at the side of the case, allowing the placing of a power driven tire inflation pump, when the truck is equipped with pneumatic tires.

Blood universal joints are used to connect the ends of the propeller shaft, three joints being used on account of the center bearing with which the shaft is equipped to prevent whipping of the shaft.

The final drive is through a worm driven Sheldon rear axle of the semi-floating type, having gear ratios of 7.8 to 1 and 6.5 to 1. Both emergency and service brakes operate on bands enclosed in the large brake drums attached to the rear wheels. The emergency brake is operated by a hand lever at the driver's right and the service brake by a foot pedal.

The rear axle housing is of unusually large size, fitted with bearings of large size, providing ample bearing surface for the driving members. The worm is mounted on the top of the housing and is easily accessible for adjustments or replacement purposes. The worm in turn drives a large worm gear which drives through the differential gears to the axles and from the axles to the wheel hubs of the wheels.

The springs are semi-elliptic front and rear, made of vanadium steel. The front springs are 2¼ inches wide and 40 inches long, nine leaves making up the spring. The rear spring is three inches wide, 54 inches long and composed of 11 leaves. The Hotchkiss drive is used in place of a radius rod. In this method



Acropplane View New Rumely 1½-Ton Chassis.

the wheels push the truck through elastic springs instead of the unyielding radius rod construction. Road jars and shocks are thus cushioned and have only a limited effect on the truck mechanism. Many wearing parts are eliminated, and a simpler, longer lived construction is possible.

The front axle is of heavy I beam construction, which combines strength, rigidity and lightness. The steering knuckles and steering arms are of special analysis chrome nickel steel thoroughly heat treated. The tie rod is located back of the axle where it cannot be damaged and is easily accessible in case of adjustment. Axle spindles are fitted with tapered roller bearings, which are adjustable for wear.

The steering wheel is a Gemmer, located at the left side of the driver's seat, the spark and throttle levers being placed under the wheel, convenient for the operator, while the gear shift and emergency brake levers are located at the driver's right.

Complete with Body and Cab.

The new Rumely 1½-ton farm truck can be purchased either with or without the body and cab and with either solid or pneumatic tire equipment as desired. The body is of ample size for general farm work and at slight expense may be equipped with special sides which allow the carrying of stock. The body shown is special Rumely combination body with grain tight express box—a body especially designed for farm usage, claimed to be unusually strong and adaptable for this class of work. It is built after the style of the old time wagons and is stated to withstand a lot of hard knocks. The sills and cross members are of well seasoned white oak, while the floor boards are seasoned and matched birch and the sides of gum wood. The entire body is well ironed, presenting a particularly clean and handsome appearance.

The body is 124 inches long, 55 inches wide and 15 inches deep inside measurements, and has a capacity of 50 bushels of wheat (60 pounds to the bushel). The body is absolutely grain tight and fitted with grain end gate. With nine-inch extensions it has a capacity of 80 bushels of oats or barley by measure.

The cattle type body is the same as the express type with the addition of stock racks. Two types of stock racks are available, cattle racks suitable for cattle, three panels on the side, two upper panels separated by 14 inches to accommodate heads of cattle, and short stakes, three panels on a side, suitable for bulky loads.

The wheelbase of the farm truck is 144 inches and the tread standard, 56 inches.



Daniel G. Throne, Widely Known in Industry, Who, as Announced in February MOTOR TRUCK, Is Now Republic National Sales Representative.

Owner of Single Truck Buys Wood and Delivers It to Patrons in Spare Time

Henry J. Palmer, 1536 Cranston street, Providence, R. I., became a practical trucker by accident, but he is in the profession now to stay. Mr. Palmer drives his own truck and is going along in good style. At the same time he is not committed to the owner-driven truck idea so strong that he is going to pass up the chance to own two trucks when business

warrants this step, which threatens to be soon.

As a matter of fact when Mr. Palmer went into the trucking business he had no idea of driving his own truck. He thought the haulage work presented possibilities and secured a Tonford as an investment. He hired a driver and things went along so well that when he had a chance to dispose of his machine at a good price he did so and purchased a 1916 1½-ton Packard, with stake body, which seemed better equipped for the work in hand. Then his driver resigned and he became an owner-driver.

Mr. Palmer takes good care of his truck and declares that its age is not apparent in its work. He has had it four months, which makes a total of five months that he has been a commercial hauler. Although he entered the business at an unfortunate time, when the textile mills which make Rhode Island prosperous were either closed or on short time, he found that by a small amount of newspaper advertising he was able to get enough work to keep him busy most of the time.

When work is slack he refuses to allow his truck to remain idle, however. He purchased a considerable quantity of cord wood for which he has found a ready sale. The job of delivering this wood keeps the Packard moving when there are no other demands on its time.

Mr. Palmer has done general trucking, making both local and distance hauls. He has done some furniture moving, but shuns this kind of work when there is anything else in sight. He refuses to move pianos, but takes orders for this class of transportation and passes it along to a friend in the same field who is better equipped for the task.

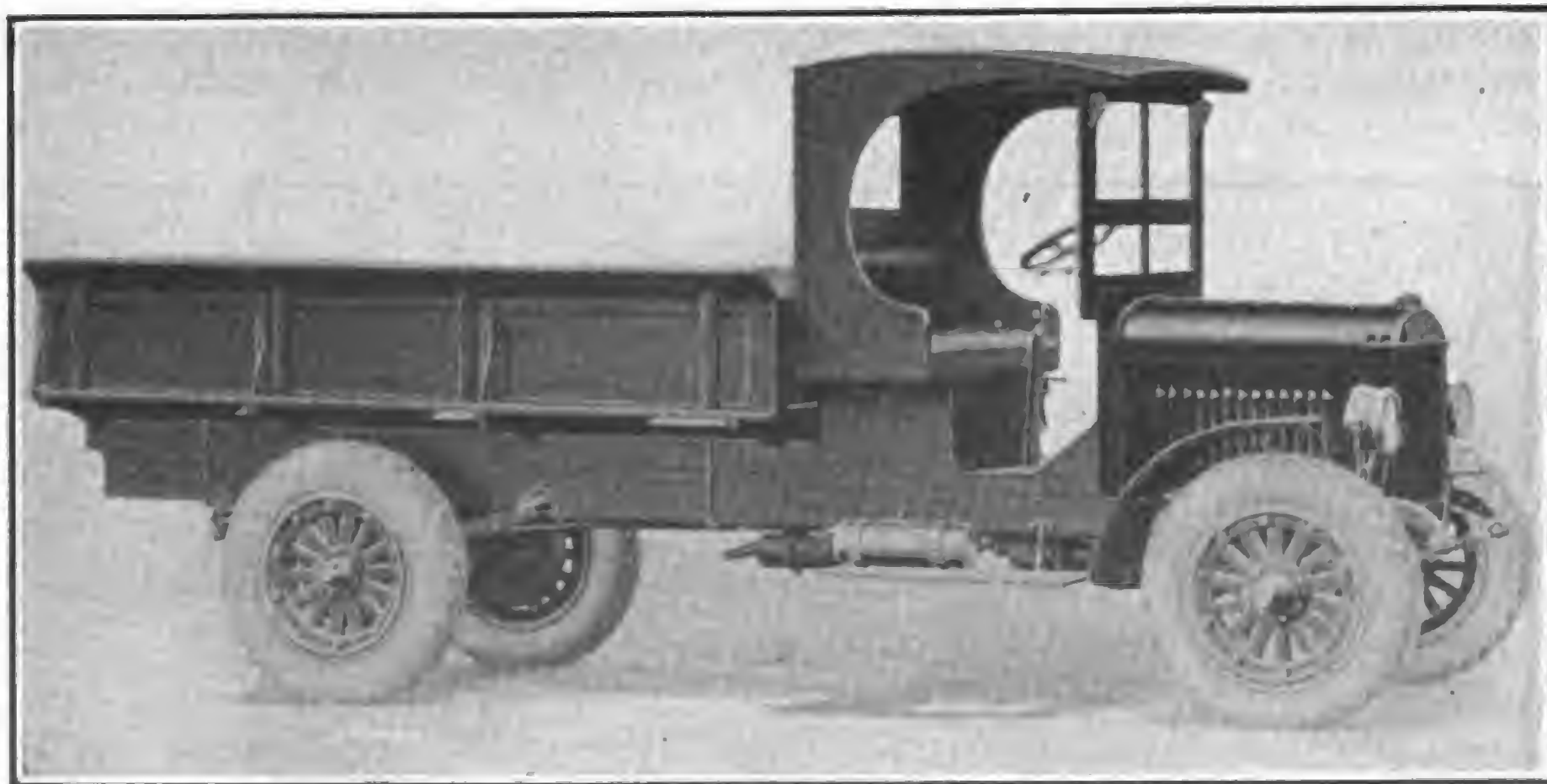
Mr. Palmer charges \$2 an hour for his service, although he occasionally does work by the job. Long distance hauling is quite often done on the latter basis or else at a higher rate per hour. He believes that the buyer of transportation is better off by paying for the job and cites a recent instance in his own experience. He offered to take a load to a Boston suburb at a job rate, but his customer demanded it by the hour. Mr. Palmer did not loaf, but his patron found that it cost him exactly \$10 more for the haul than if he had made it a job contract.

TWO INDEPENDENT MODELS.

The Independent Motor Truck Co., Youngstown, O., which is capitalized at \$1,000,000, is to get into production at once on a 3½-ton truck and in a few months intends to begin the manufacture of a speed truck.

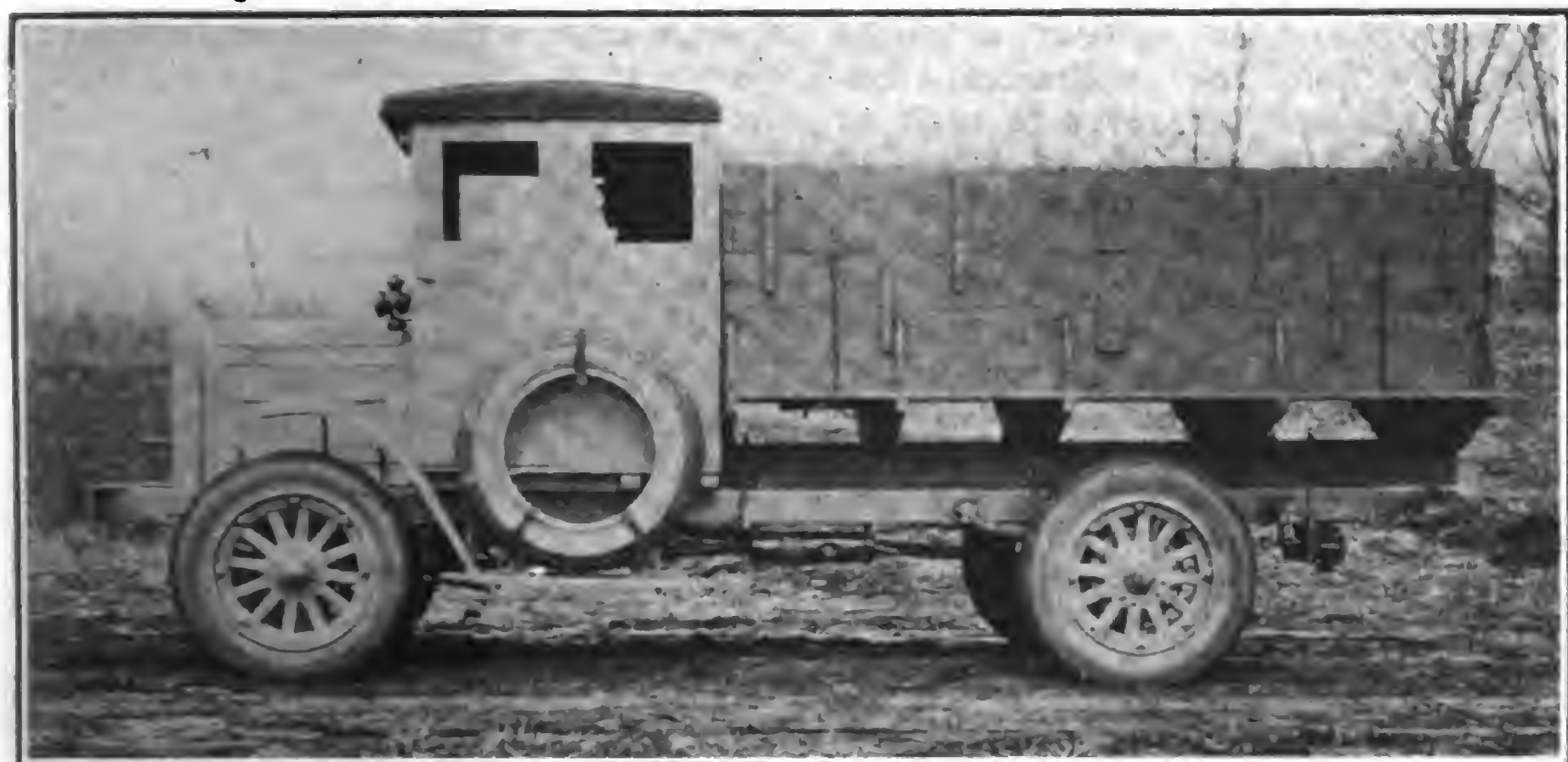
HAYES IN FULL PRODUCTION.

Hayes Wheel Co., St. Johns, Mich., has begun operating with a full force building truck wheels. The plant was closed in December and no operations have been attempted since that time.



The Advance-Rumely Farm Truck, Pneumatic Equipped, Which Won Admiration at the National Tractor Show.

TRUCKS AT NATIONAL TRACTOR SHOW



The Moline Model 10 Truck of 1½-Ton Capacity, with Farm Body, Exhibited at the National Tractor Show.

The National Tractor Show at Columbus, O., March 7-12, officially recognized the truck as farm power. Manufacturers of tractors and other farm equipment have previously put this principle into practice by adding trucks to their line. Seven tractor manufacturers exhibited their new truck models at the Columbus show.

These were: International Harvester Co., Chicago, Ill.; J. I. Case Plow Works Co., Racine, Wis.; Samson Tractor Co., Janesville, Wis.; Advance Rumely Thresher Co., La Porte, Ind.; Avery Co., Peoria, Ill.; Moline Plow Co., Moline, Ill., and Minneapolis Steel & Machinery Co., Minneapolis, Minn., which showed the new Twin City truck. The only other concerns to display trucks were the Graham Bros., Evansville, Ind., and the Atlas Truck Corporation, York, Pa., both of these being pneumatic equipped light duty trucks suitable for farm work.

Most of the farm trucks were provided with a power take-off, which appears to be an important adjunct to a truck operating in rough terrain. Pneumatic tires are regarded as standard equipment on these trucks. Pulling power rather than speed is accentuated in all of them.

The J. I. Case Plow Works Co. showed its two-ton farm truck for the first time. This job will be described in detail in an early issue of MOTOR TRUCK. The Advance-Rumely and Avery products are described elsewhere in this issue. Practically all of the other trucks shown have been reviewed.

The trucks received the earnest attention of all of the 52,000 visitors at the show, over 20,000 of whom were farmers. The good points of the various models were gone over and the plan of exhibiting at the tractor show proved profitable in every instance.

AUTOCAR DIVIDEND.

Autocar company has declared a dividend of 1½ per cent., payable March 10. In the previous two quarters the company declared quarterly dividends of 2½ per cent.

FACTORY SERVICE MANAGERS TO MEET AT BUFFALO.

Plans are rapidly being completed for the semi-annual convention of factory service managers under the auspices of the Service Committee of the National Automobile Chamber of Commerce. It has been definitely decided to hold this next convention in Buffalo and the dates will be May 17, 18 and 19. Among the subjects under consideration for discussion are:

"Advantages and Disadvantages of the Unit Replacement System for Continuous Service."

"Service Equipment."

"Service Department Organization."

"Growth and Responsibilities of the Service Department."

"Field Organization."

"Relation Between the Engineer and the Service Department."

"Better Cooperation Between Equipment Service Stations and Dealer Service Stations for the Benefit of the Owner."

APPEARANCE OF TRUCK IS GOOD BUSINESS "AD" FOR THE OWNER

Many truck owners find that one of the most valuable points in their motor equipment is the appearance of their truck and the resultant advertising of the progress and up-to-dateness of the house it serves. In addition to getting economical and efficient work from its truck the American Trucking Co., Rochester, N. Y., finds that the splendid appearance of its Ward La France 2½-ton truck is a worth-while feature, as the following letter shows:

American Trucking Company.
Expert Conveyers of Furniture and Merchandise.

Packing and Storage.
Local and Long Distance Service.
13 Richard Street, Rochester, N. Y.
Jan. 10, 1921.

Ward LaFrance Truck Corp.,
Elmira, N. Y.

Gentlemen:—

Our 2½-ton Ward LaFrance high speed truck is a splendid performer and lends itself with wonderful adaptability to our business.

This truck has given us complete satisfaction in every way. It handles with perfect ease, operates smoothly, rides as easy as a pleasure car, makes good time and road averages and with the pneumatic tire equipment, gives the greatest traction advantages.

In traveling 1150 miles the gasoline consumption was 175 gallons, or an average, under various trucking and running conditions, of better than 8½ miles to the gallon, while the oil used has been less than eight quarts.

Its attractive appearance makes it an exceptional business asset, as people naturally can't help admiring it.

We are exceptionally gratified with economical running of so large a truck and are frank to say that it has greatly exceeded our highest expectations. We have experienced no trouble of any kind. This is real satisfaction.

Yours very truly,
American Trucking Co.



American Trucking Co., Rochester, N. Y., Finds That Attractive Appearance of Its Ward-La France Truck Is a Good Advertisement.

MOTOR OMNIBUSES HERE TO STAY

(By T. J. FAY, President, Fay Motor Bus Co., Rockford, Ill.)

PERHAPS the most discussed and unsettled problem of the day is transportation, not only in suburban territory, but also in cities; people are moving away from the congested districts and want home and yard room, but present street car service is inadequate to allow the building up of the outlying city districts. The factories are taking advantage of cheaper ground, allowing them space to build daylight and sanitary buildings; then again comes the question of transportation.

There are 13,300 city and interurban railroad companies operating in the United States, 5500 of which are in the hands of receivers, and very few of the remaining 7800 paying interest on their bonds, and of this number few ever did make a dollar out of their actual operating profits. Of course we know that some billions were cleaned up on watered stock, but somebody has got to pay, and "to be sure" that somebody is the public. Street cars will have to be put on a firm paying basis if they are going to exist. Fares will have to be increased even more than they are at present.

In the meantime the inevitable progress of improved invention has crept in, until the time will soon come when the motor car will supersede the electric car. The streets will be cleared of ugly rails, switches, poles and wires and no longer will we hear the continual rumble of steel wheels and have traffic blocked by long street car stops. It is a fact that today 60 per cent. of the people of the United States travel by motor. This statement can be verified by a glimpse at any busy street in any city in our country. Only a few years ago the electric street car was the best means of transportation, but today motor car, with big pneumatic cord tires, can carry a several ton load evenly and smoothly over the ordinary city streets, very often covering a distance of from

7000 to 20,000 miles without a single change of tire. The mechanical construction has been improved to such an extent that it is possible to stop and start such a bus quickly without tearing out the rear end, transmission or any other part, every week or two. The water cooling system has also been so perfected that a bus can be run continuously 150 to 200 miles a day without refilling with water. These are the more essential reasons why a bus can be so operated as to compete with and forge ahead of the street car.

Carried 2,000,000 People.

For the past two years I have been operating bus lines and during that time have carried almost 2,000,000 people, and have never had a serious injury, which disproves the theory so often advanced concerning the danger of motor conveyances with so many motor cars on the streets.

In the city of Rockford, Ill., where we operate a larger fleet, we carry people to and from work in less than one-half the time they can be carried on the street cars. From the city limits my scheduled operation to the factory district is 25 minutes, while it takes one hour and 25 minutes on the street car. We charge a fare of 10 cents. The street cars charge seven cents. Therefore, for three cents a man can stay home 50 minutes longer. From Rockford to the end of the street car line at Camp Grant, "my largest operation," my operating time is 20 minutes, while the street car requires 45 minutes.

For the past few days we have had a terribly cold wave, the thermometer registering 21 degrees below zero, with heavy snow drifts. We have gone through without an accident; neither have we missed a single trip, while the street cars have not been able to run on their schedule. Most of the interurban

lines in this section have been unable to carry out their schedule, yet my buses are operating regularly between Rockford and Rochelle, a distance of 35 miles, in two hours and 15 minutes, making stops at five towns between these points.

I am giving you my actual present day experiences. My Camp Grant Rockford line is 13 miles round trip, yet each bus makes a trip every hour, very often with 10 minutes to spare. My Camp-Sherman-Chillicothe line is 8 6/10 miles round trip, and through the busy hours a bus makes a trip every 40 minutes.

Failures to Be Expected.

I realize that practically every bus line started in the country has failed, but at first every movie theater and almost every other new enterprise failed, although the very failures have brought experience and organization until it is possible and practical to build bus lines and give adequate service for almost every phase of transportation.

Care and experience must be used in the selection of the type and size of the chassis and body. One must have a large enough organization to handle the checking, dispatching, proper garage facilities, repair shop, incentives for the drivers to care for the buses. It is a big business and must, if successful, be handled by a large organization, but the possibilities are greater, I believe, than any other business in the United States.

For the first several months of my operation I paid dearly. There was a long time when my best friends begged me to drop the bus business, since I was financially embarrassed to such an extent, but I knew my losses were mostly my mistakes, those of inexperience, but I realized what they were and that they could be remedied, which I have done, without one cent of additional capital. That is why I know bus line operation is here to stay.



TWO NAPOLEONS.

On the Right, C. D. Peet, General Manager, and on the Left, W. G. Rath, Newly Promoted Secretary-Treasurer, Napoleon Motors Co., Traverse City, Mich. These Officials Played an Important Part in Keeping the Organization Running on High Throughout the So-Called Depression, Their Efforts, Backed by the Assistance of Enthusiastic Co-Workers, Resulted in the Splendid Financial Report Which Will Be Found in Another Column of This Issue.



Marketing the Commerce Truck

Powerful New England Organization Being Lined Up by Able and Experienced Executives
Service Is Guiding Note in Distribution Plan.



W. E. Kelton, President, Commerce Motor Co. of New England, Inc.

NEW ENGLAND, admittedly the nation's most fertile field for truck distribution, and containing within its environs some of the most progressive wholesale merchandising establishments for this line of business, has had its prestige materially increased by the recently formed Commerce Motor Co. of New England, Inc., which will handle through its branch agencies, the products of the Commerce Motor Car Co. of Detroit, Mich.

The new organization, which is located at 20 Brighton avenue, Boston, in the heart of the automobile district, is housed in a fire-proof building, containing 7500 feet of space. The structure is ideal and has a highly suitable floor plan for the work in hand, having been built especially for a service station and show room.

The truck specialized on will be the new Commerce Mercantile Express, which is of the light express type, with a capacity of three-quarters of a ton, and other power haulers manufactured by the company will also be handled. That a big business in the smaller car will be done is shown by the orders already received. Perhaps a record sale to date was made by the Worcester, Mass., dealer, who sold the first truck sent him in



The Commerce Mercantile Express, a Speedy, Light Delivery Truck Designed Especially for City, Suburban and Farm Service.



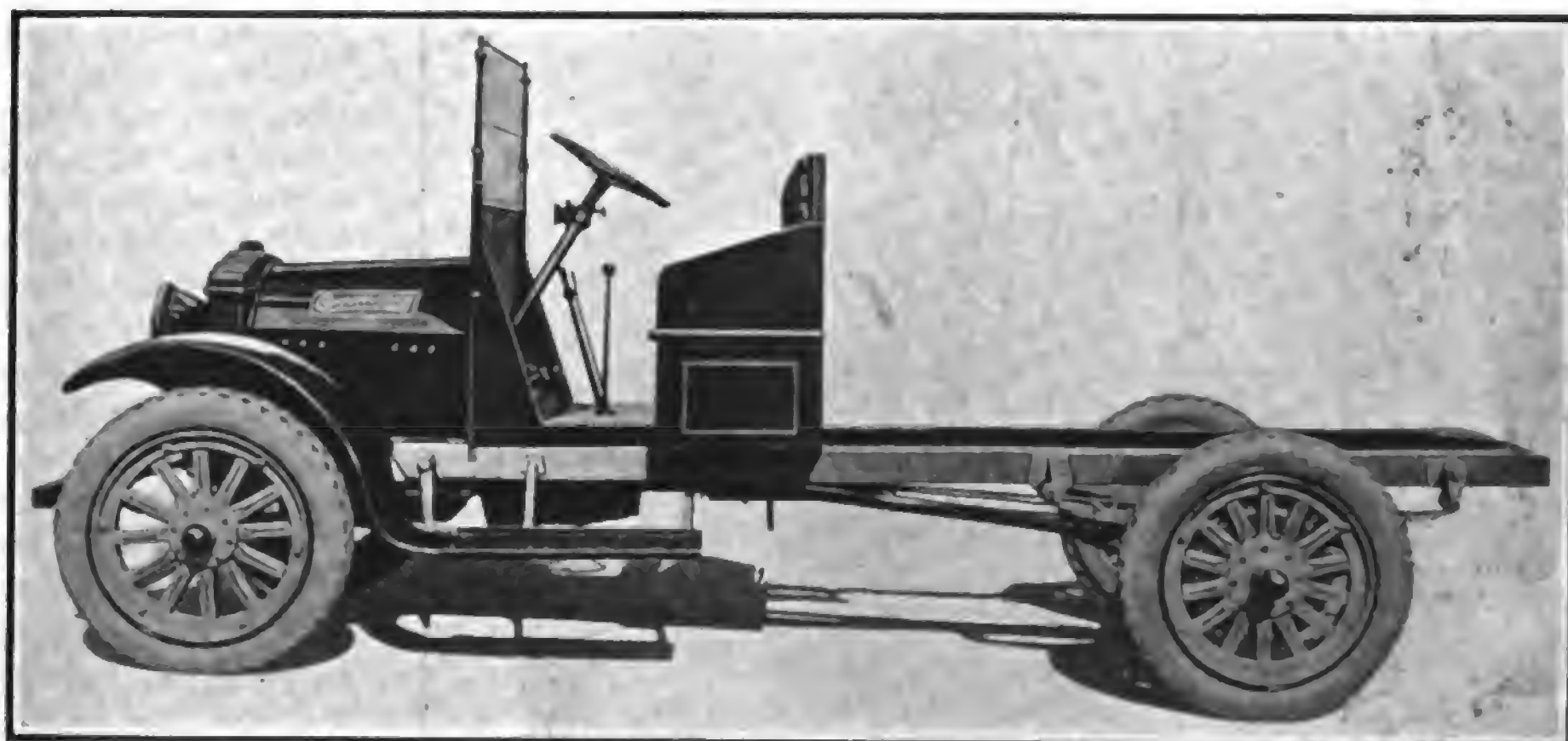
H. F. Talbert, Treasurer, Commerce Motor Co. of New England, Inc.

booked from individuals, but it has also closed several fleet installations, noticeable among which are several orders from the Postoffice Department for use in the New England states. Many of the trucks ordered for this work are already in service, and others are slated for early delivery.

Will Emphasize Service Feature.

W. E. Kelton is president of the new organization and H. F. Talbert is the treasurer. That these two men, both of whom are thoroughly versed in the merchandising of motor trucks, should have chosen to enter a

joint business, guarantees the success of the organization with which they have affiliated. Mr. Kelton has for more than 16 years been identified in a selling way with very large automotive interests, and Mr. Talbert, long known in the agency and garage business, brings a wealth of financial knowledge and a thorough training in the economic side of the business to the organization. The combination



The Rugged Chassis Construction of the Commerce Mercantile Express Commends It to Users.

less than an hour after receiving it, and other sales of a similar nature are also recorded, all of which speaks well for the future.

Not only does the new distributing concern get a flying-start in its merchandising campaign through the orders

combination augurs well for the going power of the corporation.

Both of the officials fully realize the value of service to the customer as a strong factor in the success of any business, and one of the specific conditions insisted on in appointing agents is that

ample service be given to the buyer of a Commerce truck. Regardless of whether the purchaser buys the one vehicle, or a fleet, it is the same to the distributor, who insists that adequate service shall be given to all.

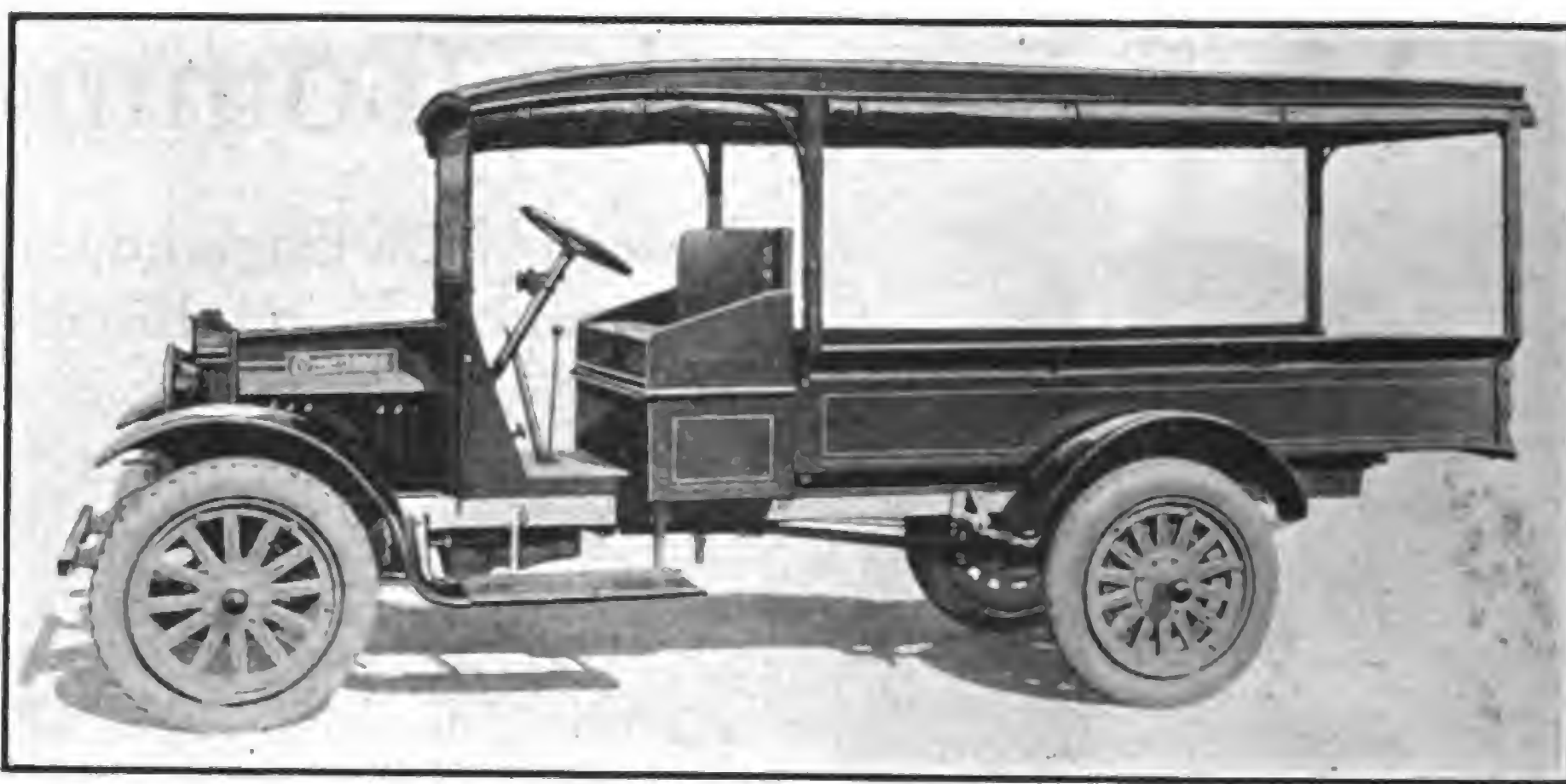
The dealer is expected to stock parts for the trucks in varying amounts, depending wholly on his territory, and the Boston office will be prepared at all times to give extra service in the way of sending cut parts by special delivery, or by personal messenger if the occasion is drastic enough to warrant. A minimum charge will be made for all service not covered by the manufacturer's guarantee, and this will be based, so far as possible, on the assumption that even though the guarantee may have expired, the manufacturer is willing to adjust the matter by meeting the customer more than half way.

With full understanding of the hectic conditions of the last few years, the new organization realizes that the morale of the truck business should be constantly seeking a higher plane on which to function, and intends, in the words of President Kelton, "To treat the customer at all times as though he were a prospective buyer, rather than one who has already purchased."

Keeping Customers Sold.

This company practically guarantees to the dealer who follows its rules, that the man who once purchases a Commerce truck will always be a buyer of that particular vehicle, by reason of the exceptionally fair treatment which he will be given, and the plans outlined for this service appear worthy of the best traditions of general business life.

Mr. Kelton has some unique views on the subject of service and strikes a modern chord when he says, "The time has come for the automotive industry to realize that real service in the true sense of the word must be thrown in as good measure to the purchaser of a car or



The Canopy Top Body Offers Ample Loading Space for All General Purpose Work.

truck. The automotive industry, the second largest in the world, will reach new high levels only by attention to the important detail of service.

"To my way of thinking the time is coming soon when this service will be given in much the same way that typewriters, adding machines, cash registers and dictaphones are cared for. In a measure that is just what we are planning to have our agents do, and all that have lined up with us have expressed a willingness to so cooperate. The old platitude that 'service is service only as it serves,' is an apt expression of the kind of service that we intend to give, and the customer who buys our product will be convinced of the truth of the assertion."

Incidentally, while on the subject of service, the company will also take care of its dealers in a way that should make for complete cooperation. Traveling sales engineers will be employed who will call on each dealer and sub-agent at certain stipulated periods and will not only be prepared to handle any cases of readjustment that may come up, but will also go out with the agents' salesmen and call

on prospects with a view to selling them a truck.

In addition to this, the traveling representative will carefully go through the stock of parts carried by the dealer and will see that he is carrying at all times the proper amount. This representative will aid the dealer in every way that can be desired and will be able at all times to answer any question relative to the business.

Mercantile Express Made up of Standard Units.

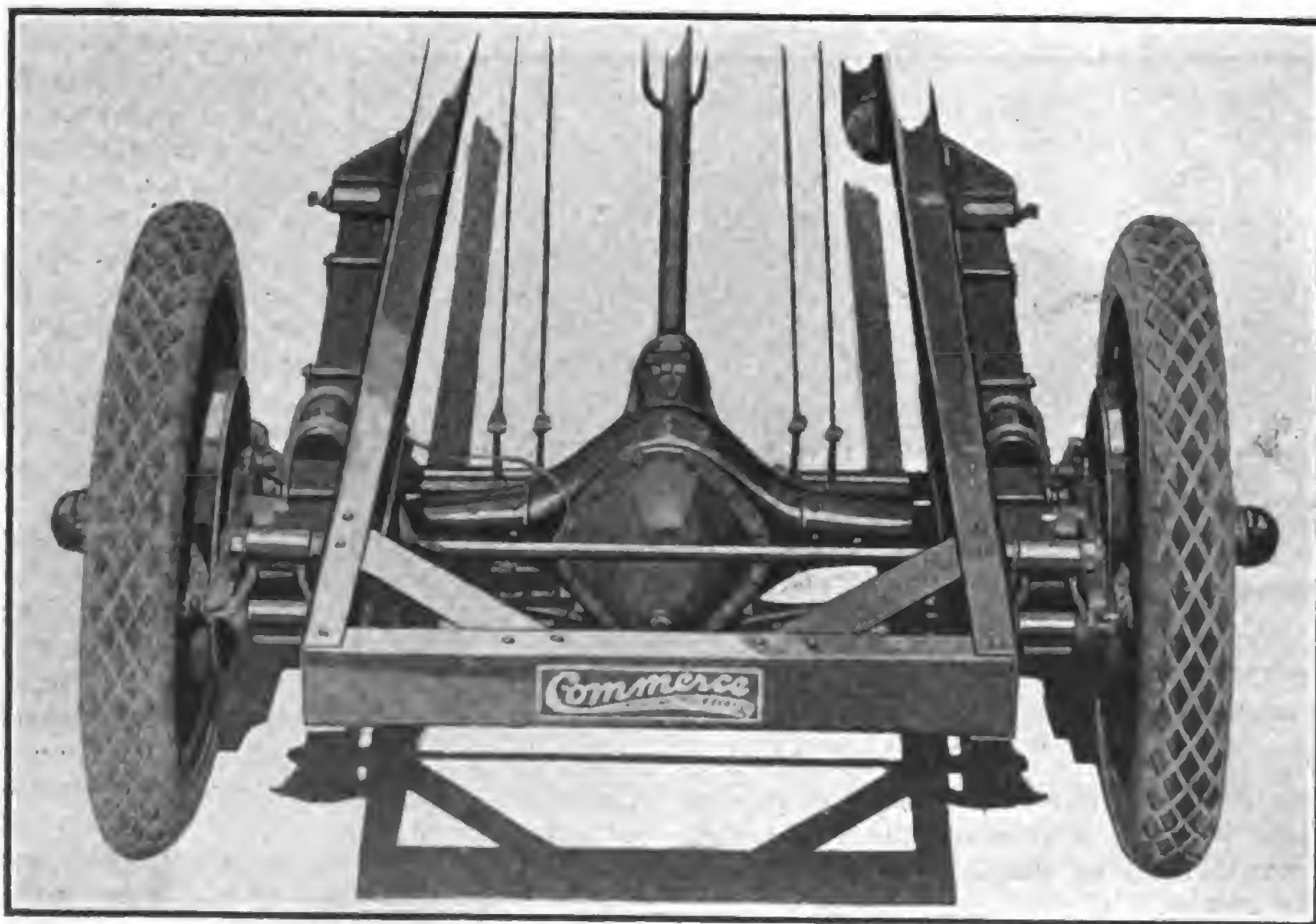
The Commerce Mercantile Express was designed to be the fastest, finest and lowest priced car in its class. It is sold to the customer with complete equipment and the cab top and body are optional. The speed truck has been solely designed and manufactured to be used with pneumatic tires, and the manufacturer disclaims all responsibility if solid tires are used. Fully appreciating the good features of the solid tire, it is pointed out that the high speed at which the vehicle will be operated does not admit of using the less resilient type of wheel equipment, and this fact is impressed on the purchaser.

The truck has three speeds ahead, the highest being used when the machine is returning from a delivery job at which time a speed of 40 miles an hour can be attained. This method admits of great saving of time when there is no return load for the vehicle, and is greatly appreciated by those who have used the speed power hauler.

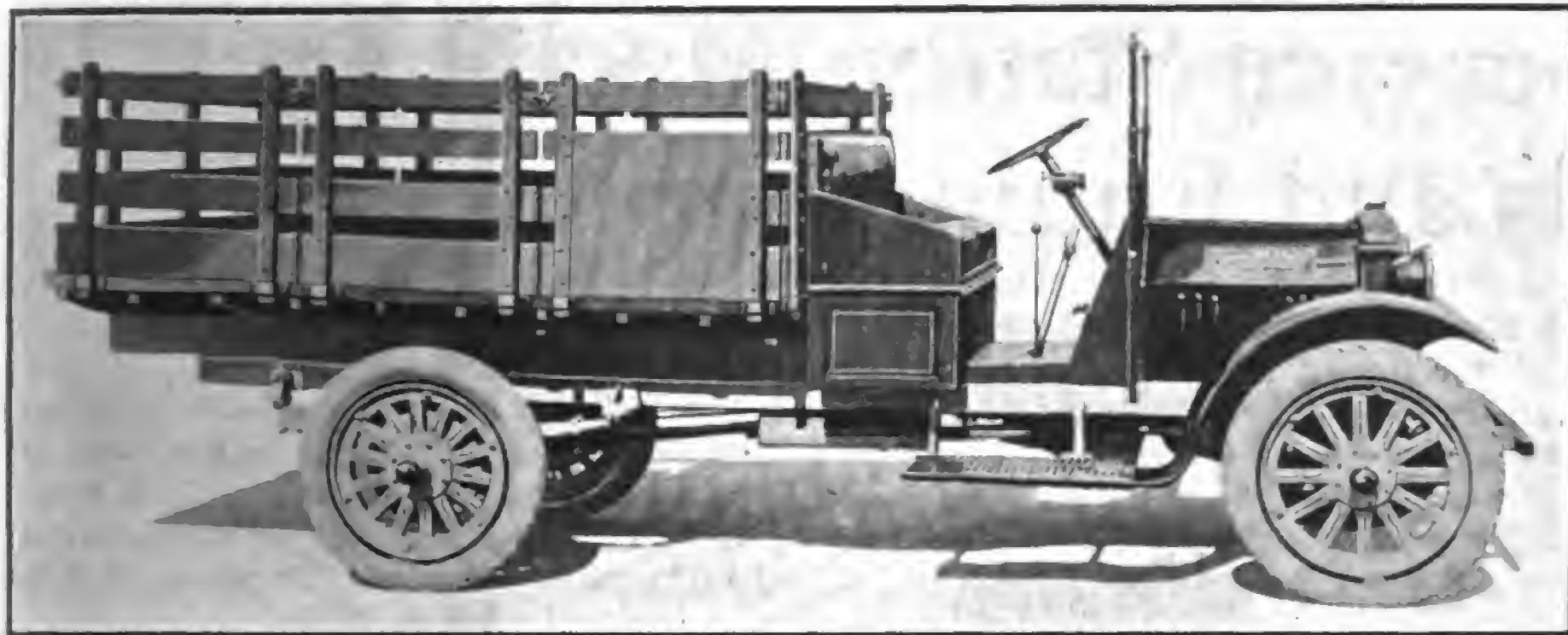
The motor is the well known Continental Red Seal truck type, a recognized standard in truck engines. This power plant is a four-cylinder, 3 $\frac{1}{4}$ -inch bore and a five-inch stroke. The crankshaft has three bearings.

The transmission is of the extra heavy truck type, and is in unit with the motor, and the shafts are mounted on ball bearings throughout.

The clutch, of the cone type, is 14 inches in diameter, and is very simple and efficient, with a special handy lubrication cup for the thrust bearing. The propeller assembly is made up of a Spicer tubular propeller shaft of nickel steel, which is provided with two Spicer universal joints.



Rear View of Mercantile Express Chassis Showing Construction and Accessibility of Axle.



The Combination Stake and Platform Body Makes Splendid Chassis Equipment for General Farm Haulage.

Has Special Rear Axle.

The rear axle is of the bevel high speed, three-quarter floating type, possessing the principal advantages of the full floating, with the easy removal of shafts, and of the semi-floating type, which eliminates the excess load on bearings and tubes when rounding curves. It has a ratio of five to one. The shafts, of special chrome nickel steel, are heat treated. The seamless steel housing is pressed on and securely riveted to center, thus doing away with the chance of rupture which might be possible if it was riveted, due to the give and take of the joint.

The brakes are 16 inches in diameter and are very powerful, giving positive control of the machine at all speeds, the emergency brakes being

of the internal expanding type, and the service brakes external expanding, contracting on the rear wheel drums. The front axle is the conventional truck type, drop forged, I beam section.

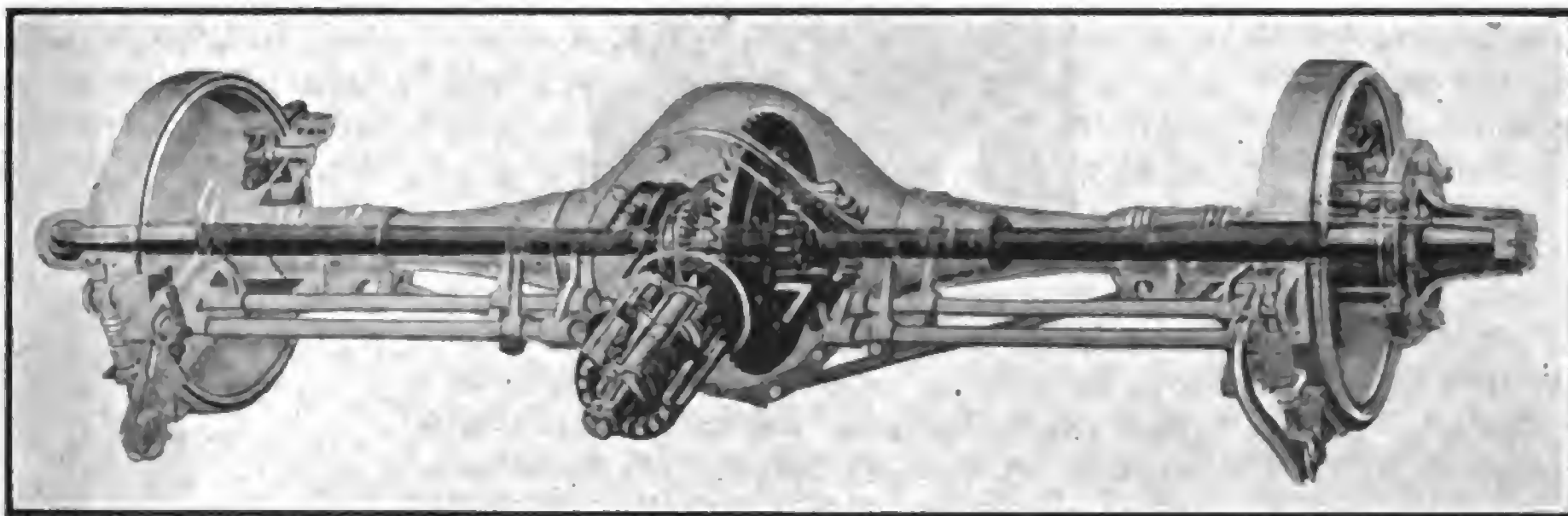
The wheels are mounted on heavy roller bearings in front, and are of the heavy wooden artillery type, with 12 spokes in each, which are $1\frac{3}{4}$ inches square. The rear wheels are similar, with the exception of having 14 spokes. The tires are 34 by $4\frac{1}{2}$ inches, non-skid Goodyear cord truck tires, both front and rear, and all rims are demountable, a spare rim being included so that time out for tire repairs while on the road is reduced to a minimum.

The springs are made by the Detroit Steel Products Co. of silico manganese metal and are semi-elliptic, the front being an eight-leaf member, 36 by $2\frac{1}{2}$ inches. The rear spring is unusually long and rugged, being 50 by three inches and containing 10 leaves. These are bushed with bronze and lubrication is by means of oil cups.

The steering gear is the Jacox truck type, expressly manufactured for hard service. Easily accessible to the mechanic this entire steering post and wheel may be lifted out of the chassis without disturbing the cab, and, like

every other unit entering into the truck, has been indorsed by those who have used it. It has a worm and a split nut, the steering wheel diameter being 18 inches.

The Zenith carburetor with the Stewart vacuum feed system is used, having the air control on the steering column and the throttle control on the steering post. It is also equipped with a foot accelerator. A flexible metal tube from the exhaust manifold warms the gas before



Phantom View of Three-Quarters Floating Type Rear Axle System Used on Mercantile Express.

entering the carburetor, thus insuring flexibility to the motor.

The tank has a gasoline capacity of 15 gallons. It is a welded unit and is located under the front seat. The thermo-siphon system of cooling is used in connection with the Commerce cast tank radiator, which has a capacity of four gallons. This radiator is designed with a large opening, has finned cast tanks and a removable core. The lubrication is by force feed and splash, with an oil capacity of six quarts.

The Eisemann G-4 magneto, which is standard equipment on so many high grade American trucks, is the ignition system used. The Eisemann was chosen because it seemed to be ideal for the purpose in hand, and subsequent tests under any and all running conditions have proven its worth.

The Bijur electric starter and the Bijur ball bearing generator are the electric equipment used, with a Willard 6-80 ampere-hour, rubber threaded storage battery. All wiring is in armored cables, and the ammeter and ignition switch are mounted on the dash, the starting button also being conveniently located. Head lights are equipped with dimmers and there is an electric tail light.

The machine has a wheelbase of 127

inches, which, with the length of spring, makes for ideal riding conditions under load. The loading space takes in an area of 110 inches from the driver's seat with a proportionate width, and the proper load capacity for efficient service is between 1500 and 2500 pounds. The machine has a turning radius of 26 feet.

The frame of the vehicle is a $4\frac{1}{2}$ -inch channel, special truck frame, with four cross members for rigidity. The driver's seat has nine-inch upholstery with spring cushions and a spring back. The maximum speed of the truck is 40 miles an hour. The fenders are made of 14 gauge steel with dust shields and are heavily ironed and enameled. The chassis is finished in Lafayette grey with carmine striping, and the bodies which are supplied extra are finished in St. Mihiel brown with black and gold striping, the radiator and dash being painted in similar colors.

The standard equipment of the truck briefly listed, is as follows: Electric starter, electric lights, windshield, bumper, fenders, running boards, sight feed lubricator on dash, foot accelerator rest, horn, tool kit, pump, jack, tire, repair kit and spare demountable rim.

The specifications of the two larger trucks are materially the same as those of the smaller one, although they are somewhat heavier and have been manufactured for different duty. Many of these trucks are now in use throughout New England and from the stand-

point of utility and service have made a desirable record for their builders.

The Commerce Truck Co. has been actively engaged in the manufacture of $\frac{3}{4}$, 1 and $1\frac{1}{2}$ -ton trucks for more than 10 years, and the new Commerce Mercantile Express is the modern result of these years of experiment.

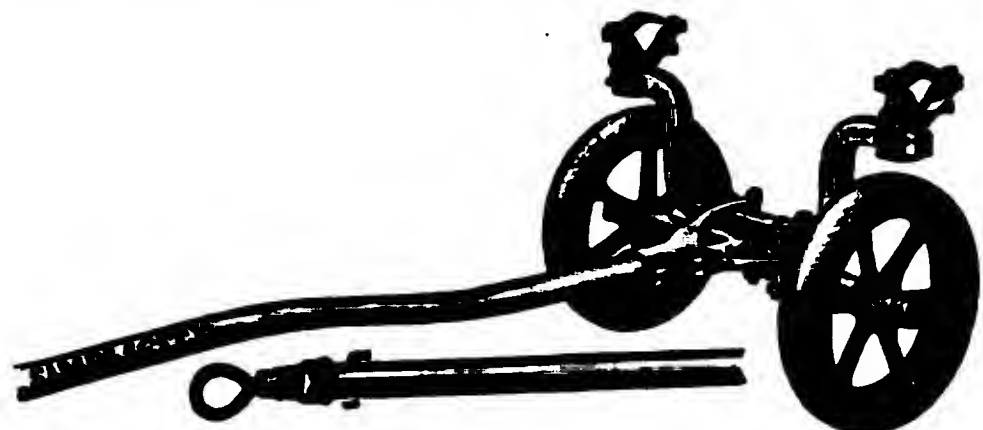
The officials of the Commerce Truck Co. of New England, Inc., after a careful survey of the merchandising field, are optimistic regarding truck sales during the current year. They see a potential market, that with proper development, will assume proportions of great magnitude, and orders already booked for immediate delivery tend to show that they have the right viewpoint. With unbounded faith in the trucks they represent, a responsive territory for their exploitation and distribution, and a selling season of unlimited scope, the newly formed organization gets away on high speed at a pace which should do much to place it in the front rank of distributors.

C. A. Marston, formerly industrial engineer of the Hupp Motor Car Corporation, and industrial engineer of the Timken Detroit Axle Co., etc., is to have charge of production of Ajax products, including trucks.

Garage and Service Station Machinery Tools and Equipment

SIMPLICITY AMBULANCE.

The Interstate Manufacturing Co., Milwaukee, Wis., is manufacturing two towing trucks, one with steel tires and the



second called the Simplicity, fitted with rubber tires, which are recommended very highly to motor truck and passenger car service stations.

The Simplicity Ambulance or truck is of all steel construction, very simple in operation, one man being able to easily raise and lock the ambulance under a disabled car without assistance. The bolster is equipped with a swivel which allows free turning of the car axle when rounding corners, and clamps are fitted to the outer ends of the bolster, which securely fasten the axle of the damaged car.

An adjustable towing pole is fitted to the ambulance, which is eight feet long and may be adjusted to 12 feet if desired. The pole is of special design, bent to avoid the car bumper, apron or truss rod.

EXCELSIOR 225-TON TIRE PRESS NO. 34.

The Excelsior Tool & Machine Co., 30th to 32nd streets, Ridge to Jefferson avenue, East St. Louis, Ill., announces a new Hydraulic Press, especially designed for forcing all sizes of solid rubber truck rims on and off the wheels of commercial vehicles. The operating principle of the press is such that no skill, experience or special attention is necessary to install, operate and maintain this press, other than the accompanying instructions.

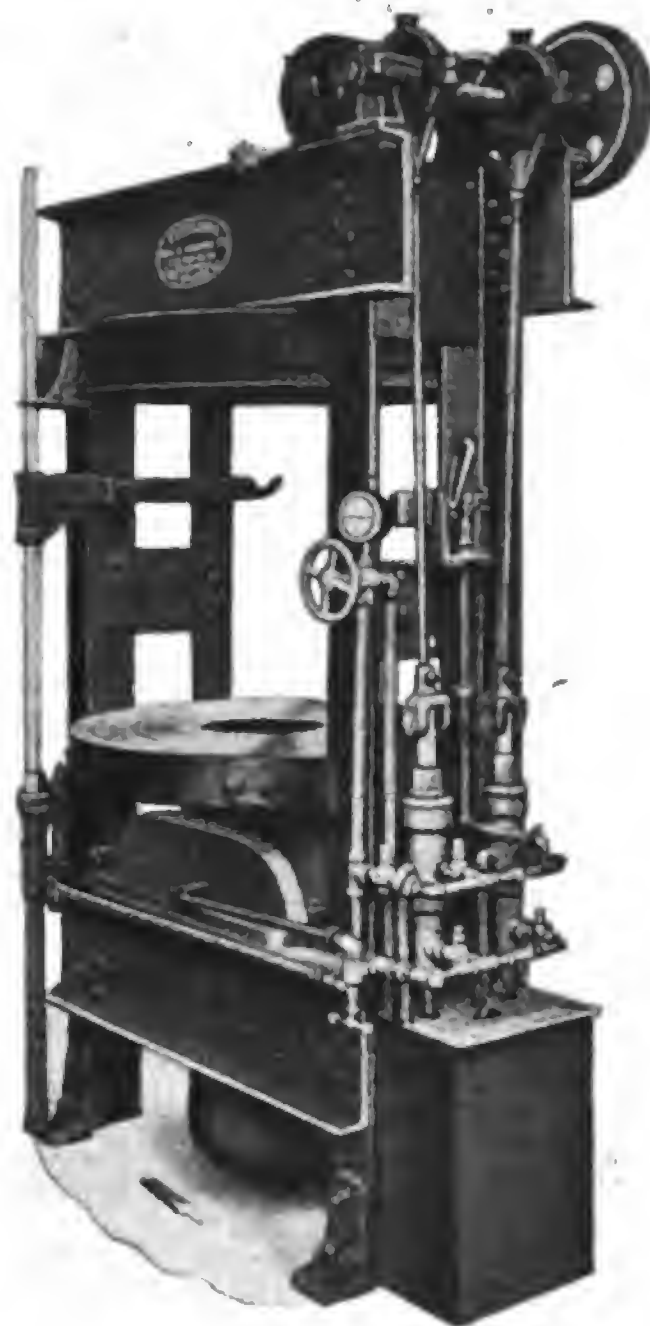
The frame is of structural steel, consisting of four six by six by $\frac{3}{4}$ -inch angles, hot riveted to four 15 by $\frac{3}{4}$ -inch channels, with $\frac{3}{8}$ -inch rivets, and reinforced by eight additional angles and steel plates, making a combination having equal stress to withstand the strain.

The cylinders, ram, platens and pump castings are of a special mixture of semi-steel. The valves are phosphor bronze of the company's own make and design, easily reground or replaced.

The pump plungers are of forged steel and all packing is the best obtainable for the purpose. The pump packing is easily replaced by releasing a set screw on the plunger casting, lifting out the plunger and using a special wrench furnished for the removal of the inside packing.

A 25-gallon oil tank is located directly under the pumps fitted with cover plates to protect the oil from dust.

Each press is operated and tested to 250 tons capacity, shipped assembled



and ready for use, bolted to skids and crated. A special feature of the Excelsior press is the hydraulic swinging hoist, which will raise the largest truck wheel from the floor and locate the wheel centrally on the forcing rims between the platens.

GLOBE SUPER VICTORY MODEL S-448 TRUCK TIRE INFLATOR.

The Globe Manufacturing Co., Battle Creek, Mich., is in production with the Super Victory Model S-448 Stationary Compressor, which is especially adapted to motor truck service stations, in which it is customary to inflate many large sized giant pneumatic cord tires daily.



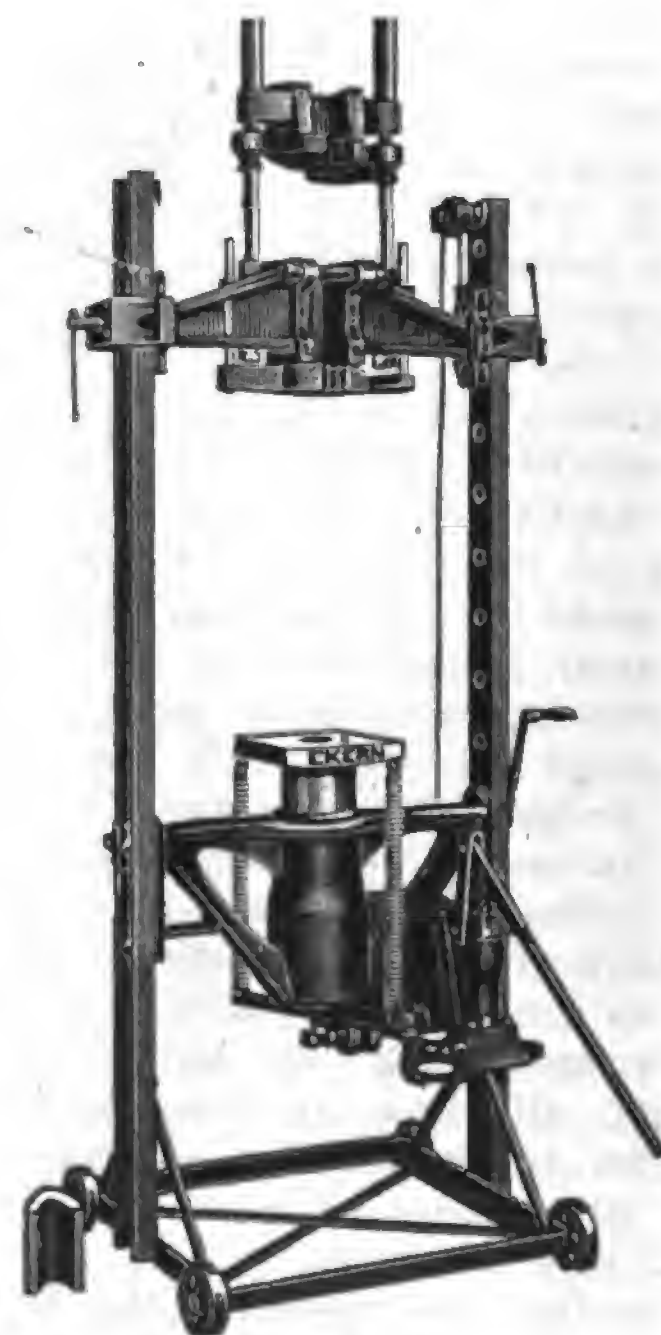
This compressor is fitted with a four by four-inch cylinder, 21 by two-inch driving pulley, and runs at a speed of 350 revolutions per minute.

The compressor has a capacity of 10 cubic feet per minute and is suitable for a large garage vulcanizing shop, repair shop or filling station. The air tank is of large size and carries a working pressure of 250 pounds. A three horsepower electric motor supplies the power which is delivered to the compressor pulley through a two-inch belt. The pressure gauge is calibrated to 300 pounds, more than sufficient for average needs.

The equipment includes 25 feet of best air hose with air chuck, brass taper connection and needle valve attached. Shipping weight 950 pounds and floor space needed for installing 19 inches by 50 inches.

EKERN'S HYDRAULIC ARBOR PRESS.

The Ekern-Turk Manufacturing Co., Pipestone, Minn., has designed a special hydraulic arbor press for the use of service stations catering to motor trucks that offers many unique features. This device is distributed by the H. G. Paro Co., 1412 S. Michigan avenue, Chicago, Ill.



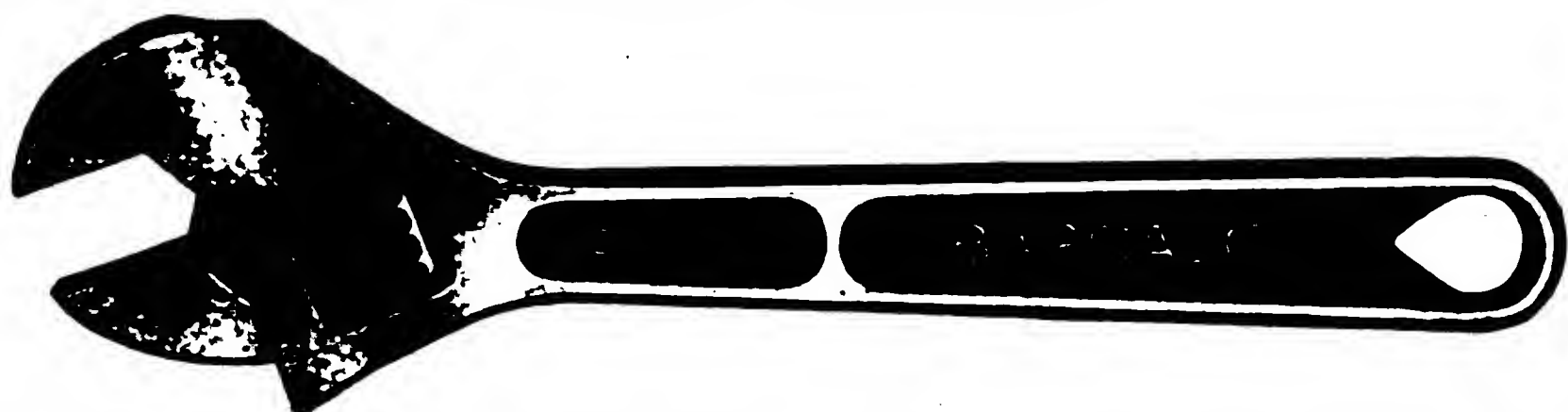
The new appliance is especially adapted for forcing gears, pulleys, collars or bushings on or off shafting without defacing the parts, also for straightening shafting, steel bars or axles, forming metal parts and many other purposes.

The press is built adjustable so that the range of work is practically unlimited. Wheel mounting is provided so that the device may be rolled to any part of the shop and after service may be stored, thus economizing valuable floor space.

New Motor Truck Accessories

BARCALO MODEL "N" WRENCH.

The Barcalo Manufacturing Co., Buffalo, N. Y., is introducing a new 22½-degree angle open-end wrench. This wrench is the culmination of 25 years'



experience gained through making metal products of all kinds.

The engineers were given orders to turn out a design equal to anything on the market and to leave nothing undone

in the matter of quality. A special analysis steel was used and all working parts were refined so that they would be absolutely dependable, allowing all parts to work smoothly, no matter how difficult the work.

The severest tests have been given this wrench and it is reported to have stood up admirably under all circumstances. Adopted by repairers and chauffeurs whenever shown.

TRAX-YUN TRUCK TIRE CHAIN.

The Cleveland Chain & Manufacturing Co., Cleveland, O., is in production with a new truck tire chain, which is designed to eliminate spoke and rim fastenings.

The Trax-Yun Truck Tire Chain consists of seven separate cross chains, each having an elongated link at one end. The link is small at one end and large at the other to allow the end of the cross chain



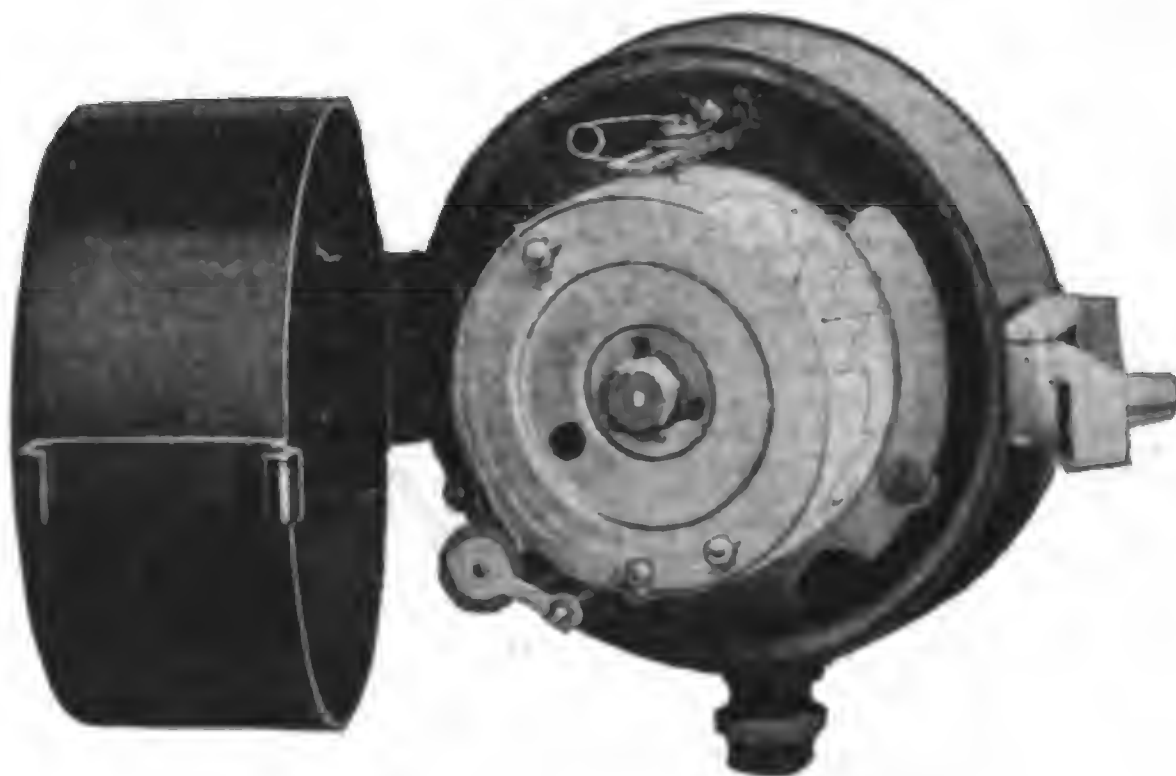
to pass through, and the small end slips down between the chain links, preventing the chain from working out of place. Seven coiled springs connect the seven cross chain ends and fasten them to a heavy wire which slips over the wheel hub, distancing the springs from the wheel hub, while the springs provide sufficient tension to keep the chains in position on the tire.

THE RECORDOGRAF.

The American Taximeter Co., Broadway at 61st street, New York city, announces a new truck recording instrument called the "Recordograf," which is

claimed to accurately record the work of a truck to which it is attached, by means of a clock. A pencil, operated by the turning effect of the front wheel, records the distance traveled in a given time on a strip of paper or tape fed onto a drum and operated by the clock. The recording mechanism, which is driven by the flexible shaft, is a worm shaft driving a worm wheel. This in turn rotates an eccentric cam. The pencil mechanism is actuated by the eccentric cam and travels in a guideway.

The combination of a clock, recording mechanism and pencil mechanism produces on the tape a clear, mechanically accurate record of time, distance, speed and stops.



The tape record can be analyzed to furnish extensive data that will serve as a means of curbing waste and increasing efficiency.

The large percentage of unproductive time involved in ordinary truck operation can be absolutely established, and with this information to serve as a basis for a reduction of wasted time, great savings can be effected.

NEW STANDARDIZED ACETYLENE GAS HEAD LIGHT.

The Indiana Lamp Co., Connersville, Ind., announces a new heavy duty truck head light, which is designed for use on heavy duty trucks. The lamp is well balanced and extremely rigid so as to

withstand the effects of the unusual conditions imposed by service on this type of vehicle.

The units of the lamp are unusually well constructed and all metal parts are made heavy to withstand the strain. The reflector is an extra heavy genuine Man-gin mirror, held securely in place by two steel clamping rings, fastened by four bolts extending through a heavy sheet metal body and equipped with four lock



washers and eight nuts.

The burner is a De Luxe type, located correctly to give the utmost light. The door is hinged at the top in such a manner that if it is left open, or drops accidentally, the door will catch without damage to the lamp.

IDEAL HOOD HOOKS.

The Ideal Brass Works, 560-570 North Elder avenue, Indianapolis, Ind., is show-

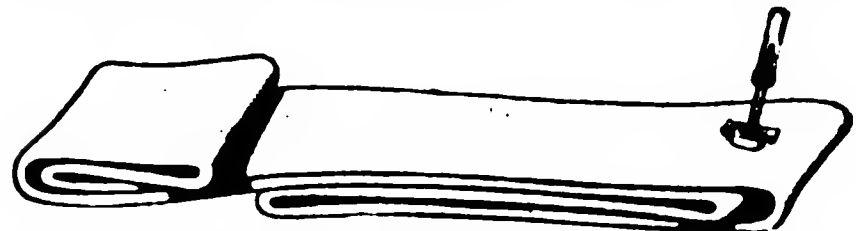


ing a new hood fastening device that may be used with equal satisfaction for either truck or passenger car hoods.

The new hood catch is simple in design, easily attached to the frame and hood of the truck and is very simple in operation.

TIROMETER FOR TRUCK TUBES.

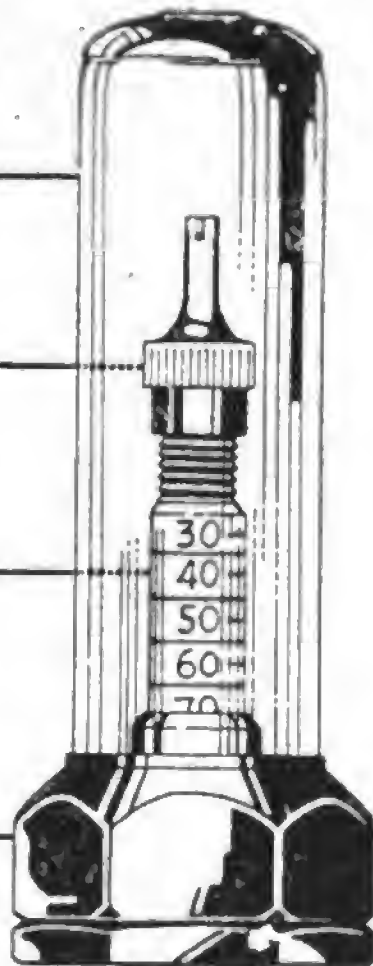
Currie Brothers Co., Atlanta, Ga., is in production with a larger, heavier type device for use with the heavy tubes used in giant pneumatic cord truck tires. This device is called a Tirometer and takes the place of the regular valve, showing



at all times the inflation pressure in the tube. The device is amply protected by a transparent dust cap, which fits over the valve, fastened by a hexagon nut at the bottom.

A new tube is being manufactured by this company, fitted with the new device, for the use of truck owners, and is especially constructed for use with the larger sized tires.

The tube is of pure gum, full laminat-

TRANSPARENT DUST CAP**VALVE CAP****GAUGE SHOWING AIR PRESSURE****BASE OF DUST CAP**

ed construction, made with a special preservative, which assures endurance and resistance against heat. The tube is made in both red and gray up to and including the 37 by five-inch size, and in the 36 by six-inch, 38 by seven-inch and 40 by eight inch, in red only.

GIANT GRIP TRACTION EQUIPMENT.

The Giant Grip Manufacturing Co. of Oshkosh, Wis., manufacturers of Giant Grip Traction Equipment for motor



trucks, has patented and produced a standardized twin clamp that is of interest to every truck owner. This equipment insures the truck against time lost through tie-ups due to mud, sand, snow

or other bad going.

The device is extremely simple and consists of a twin hook and eye clamp of drop forged special analysis steel and a back plate bolted to the spokes at the felloe. Each clamp anchors two chains. The chains are carried in the tool box and when needed are hooked on in two minutes time. A patented connecting hook engages in the eyelet of the clamp, locking the chain securely.

The truck operator is enabled to attach the chain without tools and without jacking up the wheels—the clamps being left on permanently. The simplicity of the device saves time and makes removal of the chains so quick and easy that the driver is not tempted to leave the chains on when not needed.

Giant grip twin clamps are made in three sizes, graduated according to tonnage to equip all trucks with wood wheels and solid tires.

Giant grip traction equipment is proving particularly interesting to service stations as they do not have to carry a large assortment. One size fits over 400 different makes of trucks. The company also manufactures equipment for all types of steel wheels.

GILL PISTON RING.

The Gill Manufacturing Co., 83rd street and Jeffery avenue, Chicago, Ill., manufactures a complete line of replacement piston rings for motor truck and tractor engines having engine trouble which causes expensive delays. Statement is made that 90 per cent. of the trouble is due to fouled spark plugs and carbon accumulations, both of which can be overcome by using proper piston rings.

Gill Piston Rings are made from single piece castings of special grey iron and machined accurately. They are self-fitting, one-piece rings of sturdy con-



struction, having a distinctive joint which forms a seal that prevents the passage of gas or the pumping of oil from the cylinder walls into the combustion chamber.

Gill rings are guaranteed to increase power, prevent smoking resulting from oil suction, to overcome excessive carbon trouble, and to reduce gasoline and oil consumption. When the engine is fully equipped with Gill Piston Rings the company states that it will refund the full purchase price upon return of the rings if they fail to meet this guarantee. This guarantee does not cover rings used in scored or out-of-round cylinders until they have been reground.

PREST-O-GRIP ALL CHAIN UNIT.

The Rowe Calk and Chain Co., Plantsville, Conn., is showing a line of non-skid chains adapted for use on motor truck

wheels. Particular stress is laid upon the fact that they can fit practically any type of motor truck wheel equipped with either solid or giant pneumatic cord tires.

Special fasteners are used which hold the chains securely on the wheel and al-



low plenty of slack to prevent them from cutting into the tires.

The Prest-O-Grip all unit chain has been designed especially for steel spoke wheels and this type of chain and fastening device is especially adapted for steel spoke wheels that cannot be fitted with a regular spoke clamp, particularly on the dual tire type.

ECLIPSE VALVE GRINDER.

The Eclipse Valve Grinder Co., 20th street, at Oak, Terminal Railway building, Kansas City, Mo., is showing an Eclipse Valve Grinder which is claimed not only does a much better job of grinding valves than by hand methods,



but does it much more quickly and at a fraction of the cost.

The grinder is of attractive appearance, light in weight, of ample power, simple in design, has few parts and is of just the right shape to be easily handled.

Mechanical Specifications of Motor Trucks—1920

REVISED EACH MONTH

KEY OF ABBREVIATIONS. *Against name, first time listed. **FRAME MATERIAL**-R-C., Rolled Steel Channel Section; R-I., Rolled Steel, **MAKE OF ENGINE**-Beav., Beaver; Cont., Continental; G-B-S., Golden, Belknap & Swartz; Hink., Hinkley; Her-Spill., Herschell-Spillman; Herc., Hercules; Lyeomg., Lyeomg.; Wauk., Waukesha; Wisc., Wisconsin. **CYLINDERS**-CAST-B., Block; 1-Single, 2-Pairs. **LOCATION OF VALVES**-R., Right; L., Left; O., Opposite; H., Head. **COOLING SYSTEM**-G., Gear; P., Pump; T., Thermo-Syphon; A., Air. **RADIATOR**-Fin., Finned Tubes; Sq., Square Tubes; V-T., Vertical Tube; Z-Z-T., Zie-Zag Tubular; Cell., Cellular; Hel., Helical; Ring., Tubes in Circle Around Fan. **MAKE OF GOVERNOR**-Wauk., Waukesha; Rugg., Rugles; Mon., Monarch; Dup., Duplex; H-Sp., Herschell-Spillman; Mil., Milwaukee; Simp., Simplex; Con., Continental. **CARBURETOR**-MAKE AND **FEED**-Scheb., Schebler; Ray., Rayfield; Stimb., Stromberg; Shak., Shakespear; Flech., Flechter; Zen., Zenith; Johns., Johnson; G., Gravity; V., Vacuum; P., Pressure. **CLUTCH TYPE**-D-D., Dry Disc; P., Plate; C-U., Control Unit. **GEARSET TYPE AND LOCATION**-Sel., Selective Sliding Gear; Prog., Progressive Sliding Gear; Ind-C., Individual Clutch; Plan., Planetary; C-U., Control Unit; Fric., Friction; Electric. **GEARSET LOCATION**-Amid., Amidships; U-M., Unit with Engine; U-J., Unit with Jackshaft; U-X., Unit with Axle. **FINAL DRIVE**-Int. G., Internal Gear; Chn., Chain; Sp. B., Spiral Bevel; D-Red., Double Reduction Gear; S., Spur Gear; Ex., External Gear; F., Worm. **MAKE OF REAR AXLE**-Salis., Salisbury; Torb., Torbenesen; Wisc., Wisconsin. **TYPE OF REAR AXLE**-F., Full-Floating; S-F., Semi-Floating; D., Dead. **TIRES**-P., Pneumatic; S., Solid; St., Steel. **IGNITION SYSTEM TYPE AND SPARK ADVANCE**-D., Dual; H., Manual Advance; S., Single; A., Automatic; F., Fixed; Eism., Eisceman; Split., Splitdorf; Conn., Connecticut; West., Westinghouse; G-D., Gray & Davis; Belg., Berling; At-K., Atwater Kent; Al-Ch., Allis-Chalmers; U. S. L., U. S. Lighting and Heating Co.; N-East., Northeast; Split-App., Split-Appel; Huff-S., Huff-Simms; Auto., Autolite; Leece N., Leece-Naville.

TRADE NAME AND MODEL	ENGINE										Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	GEARSET		Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	RUNNING GEAR				STARTING & LIGHTING SYSTEM						
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. L. H. P.	Cylinders, How Cast	Width of Piston Ring Groove					Cooling System	Radiator Type					Ignition System Type and Spark Advance	V. WHEELS				Extra Cost					
																						Spokes	Width	No. of Spokes	Size, Front		Size, Rear	Front	Rear	Hub	Spoke
A & B	3T	6,000 on app 144	144	r-c	own	4	5 1/4 x 5 1/4	42.762-r	G	fin	Bosch D-H	Scheb	elec	amid	2	int-g	own	int-g	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	48x3 1/2 d	48x3 1/2 d	none	none			
A & B	5T	10,000 on app 144	144	r-c	own	4	5 1/4 x 5 1/4	42.762-r	G	fin	Bosch D-H	Scheb	elec	amid	2	int-g	own	int-g	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	48x3 1/2 d	48x3 1/2 d	none	none			
Acason	R	2,000	2,400 142	pr-s	Wauk	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	RB	3,000	2,600 142	pr-s	Wauk	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	L	4,000	3,500 150	pr-s	Wauk	4	4 3/8 x 5 3/4	30.90-2	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	M	7,000	4,500 180	pr-s	Wauk	4	4 3/8 x 5 3/4	30.90-2	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason		10,000	5,450 172-187	pr-s	Wauk	4	4 5/8 x 5 3/4	40.00-2-1	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.75-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason		3,000	2,750 144	pr-s	Buda	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason		5,000	3,450 156	pr-s	Buda	4	4 1/4 x 5 1/2	29.00 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason		6,000	3,650 156	pr-s	Buda	4	4 1/4 x 5 1/2	29.00 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	B	2,000	2,175 130	pr-s	Cont	4	3 3/4 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	F	3,000	2,475 141	pr-s	Cont	4	3 3/4 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Acme	4,000	3,050 148	pr-s	Cont	4	4 1/4 x 5 1/4	27.20 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Acme	7,000	4,050 168	pr-s	Cont	4	4 1/2 x 5 1/2	32.40 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Acme	10,000	5,150 180	pr-s	Buda	4	4 3/4 x 6	36.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Acme	3,500	1,300 130	pr-s	Buda	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Air-O-Flex	2,000	1,305 130	pr-s	Her-Spill	4	3 1/4 x 5	16.90 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	All-American	7,000	4,800 168	pr-s	Cont	4	3 1/4 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	All Power	1,500	1,112	pr-s	Lyng	4	3 1/2 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	A. M. C.	3,000	1,130	pr-s	Lyng	4	3 1/2 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	American	5,000	3,575 158	pr-s	Wisc	4	4 x 6	25.60 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	American	8,000	4,575 158	pr-s	Wisc	4	4 1/2 x 6	29.60 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Apex	2,000	1,395 130	r-c	Buda	4	3 1/2 x 5 1/4	19.60 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Apex	3,000	1,595 130	r-c	Buda	4	3 1/2 x 5 1/4	19.60 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Apex	5,000	2,450 150	r-c	Buda	4	4 1/4 x 5 1/4	28.90 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Armstrong	1,000 on app 148	148	pr-s	Buda	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Armstrong	5,000 on app 168-148	148	pr-s	Cont	4	4 1/4 x 5 1/4	27.20 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Armstrong	7,000 on app 158-186	186	r-c	Cont	4	4 1/2 x 5 1/2	32.40 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Atco	2,000	1,332	r-c	Cont	4	3 3/4 x 5 1/4	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Atco	4,000	2,875 150	pr-s	Buda	4	4 1/4 x 5 1/4	28.90 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Atlas	2,000	1,330	pr-s	Lyng	4	3 1/2 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4		
Acason	Atterbury	20R	3,000	2,775 144	pr-s	Cont	4	3 3/4 x 5	22.50 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Atterbury	7C	5,000	3,575 153 1/2	pr-s	Cont	4	4 1/4 x 5 1/4	27.20 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Atterbury	7D	7,000	4,375 167 1/2	pr-s	Cont	4	4 1/2 x 5 1/2	32.40 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Atterbury	8E	10,000	5,975 167 1/2	pr-s	Cont	4	4 3/4 x 6	36.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	4	8.50-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Autocar	21F	4,000	2,300 97	pr-s	own	2	4 3/4 x 4 1/2	18.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Autocar	22G	4,000	2,400 120	pr-s	own	2	4 3/4 x 4 1/2	18.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Autocar	23G	4,000	2,400 120	pr-s	own	2	4 3/4 x 4 1/2	18.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Autocar	24G	4,000	2,400 120	pr-s	own	2	4 3/4 x 4 1/2	18.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Autocar	25G	4,000	2,400 120	pr-s	own	2	4 3/4 x 4 1/2	18.10 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Available	H1 1/2	3,000	2,250 145	r-c	Herc	4	4 1/2 x 5 1/4	25.60 b-r	1 1/4	cell	Eism	Wauk	elec	u-m	3	8.25-1	worm	Timken	Timken	8 1/2 x 2 1/2	8 1/2 x 2 1/2	36x5	36x5	36x3 1/2	36x5	36x3 1/2	36x5	3 1/4	3 1/4	
Acason	Available	H2 1/2	5,000	3,475 152	r-c	Herc	4	4 1/2 x 5 1/4	25.60																						

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TRADE NAME AND MODEL	ENGINE				GEARSET										RUNNING GEAR				STARTING & LIGHTING SYSTEM																	
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Width of Piston Ring Groove	Cooling System	Radiator Type	Ignition System Type	Make of Governor	Make of Carburetor	Size of Carburetor	Type of Feed	Clutch Type	Type	Location	Speeds	Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type		Size, Front	Size, Rear	No. of Spokes	Width of Spokes	Size of Flange	Hub	Bore	Make	Extra Cost
																										Front	Rear									
Day-Elder	10,000	4,000.170	100	pr-s	Buda	4	4 1/2 x 6	32.40-1	1-1	1/4	fin	fin	Eism S-H	Mon	Zenith	1 1/2	1/2	d-d	sel	amid	4	10.25	1 worm	Sheldon	36x5	40x6d	8	10 25/32	11 1/4	14 3/4	5 7/8	7 1/2	Nine			
Dearborn	3,000	2,180.126	126	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Wise	34x4	34x5	12 1/2	12 1/2	13 1/2	2 1/2	5 1/2	1 1/2				
Dearborn	4,000	2,300.148	148	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Wise	34x4 1/2	34x7	12 1/2	12 1/2	13 1/2	2 1/2	5 1/2	1 1/2				
Defiance	3,900	2,350.140	140	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Torb	35x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Defiance	4,000	2,750.140	140	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Torb	35x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
DeKalb	4,000	2,100.134	134	pr-s	Buda	4	4 1/4 x 5 1/2	27.20	1-1	1/4	cell	cell	Eism S-H	Pierce	Stmgb	1 1/4	1 1/4	d-d	sel	u-m	3	8.66	1 worm	Timken	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
DeKalb	5,000	2,600.136	136	pr-s	Buda	4	4 1/4 x 5 1/2	27.20	1-1	1/4	cell	cell	Eism S-H	Pierce	Stmgb	1 1/4	1 1/4	d-d	sel	u-m	3	8.66	1 worm	Timken	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
De Martin	2,000	2,250.131	131	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
De Martin	3,000	2,750.148	148	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
De Martin	4,000	3,050.160	160	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
De Martin	8,000	4,250.172	172	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	12,000	2,400.124	124	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	4,000	2,800.144	144	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	4,000	2,800.144	144	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	6,000	3,000.150	150	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	8,000	4,600.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1	d-d	sel	u-m	3	8.66	1 worm	Sheldon	36x5	36x6	14 1/4	14 1/4	15 1/4	2 1/2	5 1/2	1 1/2				
Denby	10,000	5,350.170	170	pr-s	Buda	4	3 3/4 x 5 1/2	22.50	1-1	1/4	cell	cell	Eism S-H	None	Stmgb	1	1																			

TRADE NAME AND MODEL	ENGINE										GEARSET				Make of Rear Axle	Type of Rear Axle	Tires, Type	WHEELS				Make	Extra Cost								
	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Valve Location	Width of Piston Ring Groove	Cooling System	Radiator Type	Ignition System Type and Spark Advance	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type				Location	Speeds	Total Gear Reduction in High	Final Drive			Size, Front	Size, Rear	No. of Spokes	Front Width	Rear Width	Front Flange	Hub Bore	
																															STARTING & LIGHTING SYSTEM
Forchler.....BX	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-F	Duplex	Zenith	1 1/2	d-d	sel	u-m	8	8.60-1	worm	Sheldon s-f	34x8	34x3 1/2	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Forchler.....AT	4	4 1/2 x 5 1/4	27.00	6	.....	.....	.....	.....	Boech S-F	Duplex	Zenith	1 1/2	d-d	sel	u-m	8	8.75-1	worm	Sheldon s-f	34x8	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Forchler.....AXT	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-F	Duplex	Zenith	1 1/2	d-d	sel	u-m	8	8.60-1	worm	Sheldon s-f	34x8	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Forchler.....BT	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-F	Duplex	Zenith	1 1/2	d-d	sel	u-m	8	8.60-1	worm	Sheldon s-f	34x8	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Forchler.....BXT	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-F	Duplex	Zenith	1 1/2	d-d	sel	u-m	8	8.60-1	worm	Sheldon s-f	34x8	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Forchler.....C	4	3 1/2 x 5	16.90	6	Boech S-A	None	Zenith	1 1/2	d-d	sel	front	u-m	3	8.37-1	worm	own	34x4	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West
Frontmobile.....FM	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-A	Pierce	Carter	1 1/2	d-d	sel	u-m	8	8.80-1	int-g	Russel	34x6	34x6	34x6	34x6	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Fulton.....D	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-A	Pierce	Carter	1 1/2	d-d	sel	u-m	8	8.80-1	int-g	Russel	34x6	34x6	34x6	34x6	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Fulton.....A	4	3 1/2 x 5	19.60	6	.....	.....	.....	.....	Boech S-A	Pierce	Carter	1 1/2	d-d	sel	u-m	8	8.80-1	int-g	Russel	34x6	34x6	34x6	34x6	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
F.W.D.....B	4	3 1/2 x 5 1/2	36.15	2-0	.....	.....	.....	.....	Boech S-H	Pierce	Stumbg	1 1/2	d-d	sel	u-m	8	8.90-1	b-4	own	34x4	34x4	34x4	34x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....25B	4	3 1/2 x 5 1/4	22.50	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....70H	4	4 1/2 x 5 1/4	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....77L	4	4 1/2 x 5 1/4	32.40	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....77C	4	4 1/2 x 5 1/2	36.10	2-0	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/2	40.00	2-0	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....70H	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....105	4	4 1/2 x 5 1/2	36.10	2-0	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....70H	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/2	41.50	2-0	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/2	25.60	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/2	28.90	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/4	32.40	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/4	32.40	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/4	40.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
Gurford.....68L	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	32.40	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	29.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	32.40	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.75-1	worm	Timken s-f	36x3 1/2	36x3 1/2	36x4	36x4	12 1/2	2 1/2	9	4 1/2	3 1/2	West	.....
G.A. Schacht.....	4	4 1/2 x 5 1/2	40.00	6	.....	.....	.....	.....	Boech S-H	Simplex	Stumbg	1 1/2	d-d	sel	u-m	8	7.													

TRADE NAME AND MODEL	ENGINE				GEARSET										RUNNING GEAR										STARTING & LIGHTING SYSTEM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in	S. A. E. H. P.	Cylinders, How Cast	Width of Piston Rings	Cooling System	Radiator Type	Ignition System Advance	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type		Location		Speeds		Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type		Size, Front	Size, Rear	No. of Spokes	Wheels		Hub	Bore	Make	Extra Cost																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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TRADE NAME AND MODEL	ENGINE										GEARSET										Make of Rear Axle	Tires			RUNNING GEAR					STARTING & LIGHTING SYSTEM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Width of Piston Rings	Cooling System	Radiator Type	Ignition System Type and Spark Advance	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type	Location	Speeds		Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type	Size, Front	Size, Rear	No. of Spokes	Front	Rear	Width of Spokes	Size of Flange	Front	Rear	Hub	Bore	Make	Extra Cost																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

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	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Width of Piston Ring Groove	Cooling System	Radiator Type	Ignition System Type	Ignition Spark Advance	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type	Location	Speeds	Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type		Size, Front		Size, Rear		Type of Spokes		Width of Spokes		Flange		Hub		Bore	Make	Extra Cost																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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TRADE NAME AND MODEL	ENGINE										GEARSET										RUNNING GEAR										STARTING & LIGHTING SYSTEM							
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Width of Piston Rings	Cooling System	Radiator Type	Ignition System Type	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type	Location	Speeds	Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type		Size, Front	Size, Rear	No. of Spokes	Wheels		Hub	Bore	Make	Extra Cost			
																									Front	Rear				Front	Rear					Front	Rear	Front	Rear
Shaw M-2	1,500	1,700-118 1/2	106 1/2	pr-s	Cont	4	3 1/2 x 5 1/2	22.50b	q	1 1/4	fin	Mag S-F	Mag S-F	None	Zenith	d-p	d-p	u-m	u-m	u-m	3	4.45-16	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw M-4	2,500	1,850-130	130	pr-s	Cont	4	3 1/2 x 5 1/2	22.50b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw M-3	3,000	2,050-153	153	pr-s	Cont	4	3 1/2 x 5 1/2	27.20b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw S85	1,500	1,110	110	pr-s	Cont	4	3 1/2 x 5 1/2	15.00	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw NF	2,000	490-104	104	pr-s	Cont	4	3 1/2 x 5 1/2	22.50b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw H	3,000	2,475-132	132	pr-s	Cont	4	3 1/2 x 5 1/2	27.20b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw J	5,000	3,275-150	150	pr-s	Cont	4	3 1/2 x 5 1/2	27.20b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw M	7,000	4,275-168	168	pr-s	Cont	4	3 1/2 x 5 1/2	32.40b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw R	10,000	5,300-180	180	pr-s	Cont	4	3 1/2 x 5 1/2	36.10b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Southern	2,000	1,495-130	130	pr-s	Cont	4	3 1/2 x 5 1/2	19.60b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw IK	2,000	1,795-143	143	pr-s	Cont	4	3 1/2 x 5 1/2	22.50b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw 76	5,000	2,250-160	160	pr-s	Cont	4	3 1/2 x 5 1/2	32.40b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw 86	6,000	2,500-174	174	pr-s	Cont	4	3 1/2 x 5 1/2	32.40b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw C	4,000	2,250-115	115	pr-s	Cont	4	3 1/2 x 5 1/2	27.20b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw B	6,000	3,000-127	127	pr-s	Cont	4	3 1/2 x 5 1/2	32.40b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw BA	8,000	3,500-127	127	pr-s	Cont	4	3 1/2 x 5 1/2	40.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw A	10,000	4,000-127	127	pr-s	Cont	4	3 1/2 x 5 1/2	40.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling	3,000	3,200-142	142	pr-s	Cont	4	3 1/2 x 5 1/2	25.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling	5,000	3,500-142	142	pr-s	Cont	4	3 1/2 x 5 1/2	30.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling	7,000	4,650-162	162	pr-s	Cont	4	3 1/2 x 5 1/2	32.40b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling	10,000	5,500-168	168	pr-s	Cont	4	3 1/2 x 5 1/2	40.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling	15,000	6,500-174	174	pr-s	Cont	4	3 1/2 x 5 1/2	40.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Sterling Chain	10,000	6,000-174	174	pr-s	Cont	4	3 1/2 x 5 1/2	40.00b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2	4 1/2	5 1/2	Dyneto	
Shaw Stewart	1,500	2,495-110	110	pr-s	Cont	4	3 1/2 x 5 1/2	15.62b	q	1 1/4	fin	Mag S-F	Mag S-F	Pierce	Zenith	d-p	d-p	u-m	u-m	u-m	3	7.20-1 worm	7.20-1 worm	Timken	f-f	32x4	f-f	32x4	32x4	12	12 1/2	12 1/2	10	4 1/2				

TRADE NAME AND MODEL	ENGINE										GEARSET										RUNNING GEAR										STARTING & LIGHTING SYSTEM								
	Capacity, Pounds	Chassis Price	Wheelbase	Frame Material	Make of Engine	No. Cylinders	Bore and Stroke in Inches	S. A. E. H. P.	Cylinders, How Cast	Valve Location	Width of Groove	Cooling System	Radiator Type	Ignition System Type	Make of Governor	Make of Carburetor	Type of Feed	Clutch Type	Type	Location	Speeds	Total Gear Reduction in High	Final Drive	Make of Rear Axle	Type of Rear Axle	Tires, Type	Size, Front	Size, Rear	No. of Spokes	Width of Spokes	Rear of Spokes	Size of Flange	Hub	Bore	Make	Extra Cost			
Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear		Front		Rear	

HORSES CHEAPER BUT HAS 18 TRUCKS TO ENSURE GOOD SERVICE

WHERE prompt, efficient service is called for the motor truck is a necessity, says the firm of David Duff & Son, New Bedford, Mass., coal dealers, which, in the same breath, says that it finds horses more economical for local deliveries, the only kind in which the concern engages.

David Duff & Son prides itself on its service and has shown its readiness to sacrifice whatever difference of cost there may be between the two kinds of hauling in order to give the brand of satisfactory service which trucks—and trucks only—permit. An institution is often measured by the quality of its service. This house is fully equipped to meet such a test.

The firm has proven its purpose not to consider cost when the good of the customer is involved by denying its cost records, which show the horse to be cheaper for local hauls, and going out and acquiring a magnificent truck fleet, comprising 18 vehicles, two six-ton Packards, eight five-ton Pierce-Arrows and eight two-ton Autocars.

That it has accumulated this fleet over a period of 10 years in the face of its evidence of the added cost, and that it is going to continue to put the patron first in its delivery plans, is clearly indicated by the fact that six of its trucks were purchased within the past 12 months, two within a month.

David Duff & Son operates on a large scale. Its huge yards are on the ocean front at Fairhaven. The firm furnishes the supply of bituminous coal to 30 mills and provides the fuel by which scores of mercantile buildings and hundreds of homes are kept warm when wintry winds blow.

Keeps 30 Mills Supplied.

Something like 400,000,000 pounds of soft coal are delivered in a year to 30 mills in the city.

New Bedford's layout is a hauling problem in itself. The city is ensconced on the side of a hill. It's all up one way and all down the other. It's hard on both horses and trucks. Practically all the Duff deliveries are up hill, except those to Fairhaven, which Community, with Achushnet, is the only suburb reached and the only territory beyond the city proper to which the firm transports its product.

These up-hill hauls are undoubtedly a factor in the cost records which show the motor hauling to be more expensive than the horse-drawn type. The figures show the extra gasoline and oil consumed, but they do not tell what is taken out of the horses in this daily grind.

Members of the firm maintain that their experience has been that the horse "gets there." They unhesitatingly admit, however, that the horse only "gets there" once, while the truck can go over the route several times. When a truck does get stalled another vehicle of the same type can quickly pull it out.

The Horse Does Not Last.

They are ready to say that the horse does not last, and that hot weather and other conditions send animal power away below par. For emergency hauls, in filling rush orders, in delivering a supply to the mill or householder when the bin is at rock bottom, for fast, dependable, up-to-the-minute-service, the Duffs doff their top-pieces to the truck.

All of the company's coal comes by water, the bituminous from Newport News, Va., and most of the anthracite from Perth Amboy, N. J. The coal is hoisted from the barges to Mead-Morrison cars, which operate on an electrically run elevated railway leading to the hoppers. A Mead-Morrison hoist dumps the contents of these cars into the pockets, from which chutes give outlets to the coal in loading.

Has 18 Trucks in Service.

All of the 18 trucks in the service of David Duff & Son have dump bodies and are unloaded through outlets in the tail gates. The big trucks have Wood hydraulic hoists and the smaller ones Rodenhause bodies, with the regular herdick hoists. The Packard and Pierce-Arrow trucks are on solid tires and the Autocars have pneumatic tires all

around. The latter type of tires increase the speed of the smaller trucks and, of course, save the wear and tear on these vehicles. Only one driver is used and the number of helpers on a machine depends on the particular job.

At one time David Duff & Son was also in the teaming business. When the organization decided to stick to the coal business alone there were 210 horses to be fed. Now this number has been reduced to 38. In addition to the 18 trucks employed, an equal number of double-horse wagons carry the coal to the consumers.

Oiling and Greasing at Night.

The Duff fleet is housed in a two-story brick garage and what the company anticipates some day may be gleaned by the facilities afforded, there being room for 35 trucks. This garage employs 10 people, including three night men. All the oiling and greasing is done at night, with the exception that necessity sometimes requires work of this character on Sundays. The trucks of the firm are kept in splendid shape, the garage being well equipped and admirably maintained, all of which helps to round out the fine type of service for which the house of David Duff & Son stands.

Pneumatics Double Hauling Capacity

The Luedinghaus model K 2-2½-ton truck, shown in the accompanying illustration, was purchased by the St. Louis Malleable Casting Co. nine months ago. It is equipped with pneumatic tires, 36x6 front and 40x8 rear. The truck is used to deliver malleable castings to the various manufacturing concerns in St. Louis and vicinity, and also to haul shipments to and from the plant.

As the St. Louis Malleable Casting Co.'s factory is located in the outskirts of the city, a truck in this service must possess speed, as well as ability to carry heavy loads.

Up to this time the Luedinghaus has traveled nearly 12,000 miles on the orig-

inal set of tires, which look good for a good many thousand miles more service. An average of almost 10 miles per gallon of gasoline is obtained. No repairs of any character whatsoever have been necessary.

The St. Louis Malleable Casting Co. also operate another make truck of five tons capacity, and state that it hauls more tonnage per day on the pneumatic equipped Luedinghaus 2-2½-ton than on the five-ton truck, which has solid tires. This is due to the fact that the Luedinghaus is so substantially built that overloads of 50 to 100 per cent. are frequently carried, and to the higher speed with pneumatic tires.



Luedinghaus 2-2½-Ton Truck Which Has Run 12,000 Miles Without Repairs.

TRUCKS TRAVEL WHERE HORSES QUIT

THE only residents of Worcester, Mass., who were not forced to drink black coffee during stretches of the 1919-20 severe winter were those who got their milk from William H. Fouracre, 22 Cambridge street.

Mr. Fouracre claims that he was the only distributor of milk in that territory who delivered every day during the worst highway tie-up the New England district has known.

Mr. Fouracre did not get his full supply, but he never failed to deliver on any day and reached every customer, even if it was with but a mite of the usual quantity, enough to make the family coffee palatable.

He reports that one milk dealer who makes his rounds with horses and who has boasted that he never missed a day before was forced to give up one day last winter. Thus did motor trucks show their superiority over horse-drawn equipment in a field and against odds where the horse has been heralded as the best transportation medium.

Naturally none dares to claim that the horse can compete with the motor truck in distance hauling or in speed. It has been claimed, however, that the single horse rig could get through snow drifts where the truck could not. Mr. Fouracre and his trucks nailed this theory to the mast during the early part of 1920.

The Fouracre trucks also got through from Worcester to Leicester, which is five miles away, every day of the storm period, his vehicles being the only ones to accomplish this on several of the roughest days.

Has Fleet of Four Trucks.

Mr. Fouracre has a two-ton International, two one-ton Internationals and a ½-ton Vim. He started in business with a pair of horses less than four years ago, going out and picking up milk on nearby farms. It was not long before he realized that he could replace his two horses with one truck and get better results, the motor vehicle going farther in quicker time and carrying heavier loads. Gradually he expanded his fleet, buying his fourth truck this past spring.

He now has the collection and distri-

bution of his milk systematized. Instead of gathering his milk here and there his two-ton truck runs to Spencer, Mass., a distance of 12 miles, every morning. About 10 o'clock the truck meets a number of milk producers from whom it gets a load of 200 cans, each containing 8½ quarts. One of the one-ton Internationals goes to Jamesville, less than a mile away, at which point 60 more 8½ quart cans are secured.

Truck Works Night and Day.

Three of the trucks start out at 5 o'clock in the morning and make deliveries to stores and restaurants. What Mr. Fouracre calls his retail business, the delivery to homes, is done with a one-ton International which goes on the job at 2 a. m. This latter truck works night and day. It is through distributing at 7 a. m. It is then turned over to another driver who operates it throughout the day on a commission basis.

This driver gets a commission on all the work he gets and does. He has one lumber hauling contract which keeps him busy part of every day. He gets much other work that he seldom quits before 5 p. m., and is quite often busy with his motor hauler up to 8 p. m. The owner gets a handsome bit of coin from the day operations of this truck and is not forced to use up any gray matter in digging up jobs for it. The driver also nets a splendid salary, which makes it a nice arrangement all around.

Mr. Fouracre now has a modern pasteurizing plant and is doing a man's size business, for which he gives a sizeable share of credit to his motor equipment.

NINE STATES PROPOSE TO LICENSE ALL AUTO MECHANICS

Nine of the 40 state legislatures now in session have introduced bills providing for examining and licensing, and, in some cases, classifying automobile mechanics, or licensing garages and repair shops. Others are likely to do so before

adjourning. These states are: Arizona, Colorado, Connecticut, Idaho, Illinois, Minnesota, Nebraska, North Dakota and Texas.

That it may be guided in the attitude it should take toward such legislation, the N. A. C. C. Legislative Committee has asked the Service Committee for an opinion upon the advisability of such legislation. Before giving an answer this committee wishes to obtain the service managers' views and has sent out questionnaires.

In general the bills provide for establishing a board appointed by governor, secretary of state, motor vehicle commissioner or department of public works to examine and license mechanics, and forbid others to work on automotive equipment except as helpers to licensed mechanics; fix license fees varying from \$2 to \$10 and fines for violations from \$10 to \$100.

The Idaho and Minnesota bills license the garage or shop, instead of mechanics, requiring a bond from the proprietor to protect judgment for damages to equipment worked upon.

INTERNATIONAL HARVESTER CO. HAS BIG COLUMBUS SPACE.

The largest floor space at the National Tractor Show at Columbus, O., Feb. 7-12, was occupied by International Harvester Co., which used 7500 square feet of cement floor for its show. The exhibit contained practically everything which applies to power farming, including its farm tractors and motor trucks. J. F. Jones, vice president; J. A. Everson, assistant sales manager; H. L. Brubaker, tractor and engine sales manager, and a large number of officials and salesmen welcomed the thousands of visitors who viewed this exhibit.

ATLANTA, GA., PLACES ORDERS FOR MORE ARMLEDER TRUCKS.

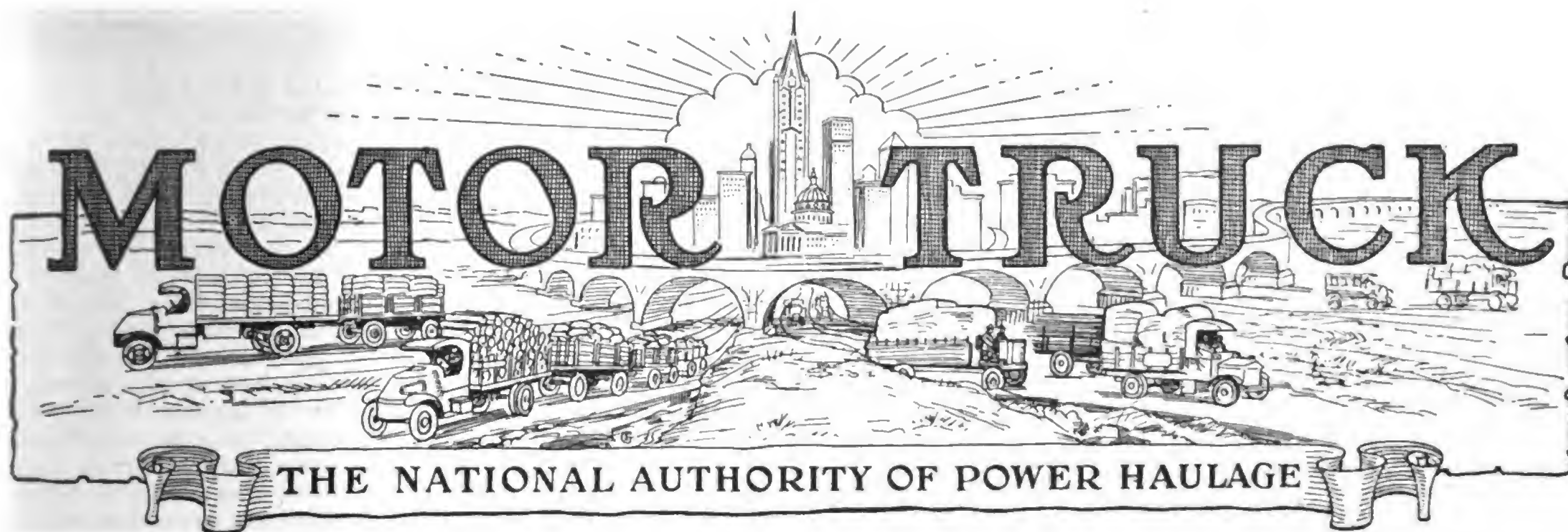
The city of Atlanta, Ga., recently placed another order for six Armleder motor trucks, which will be added to its present fleet of nine Armleder trucks, making a total of 15. These trucks will be in constant service. The nine trucks already in service give such unusual satisfaction and are operated at such low cost of expense that the city did not hesitate in placing an additional order for six, which are being shipped immediately from the factory at Cincinnati, O.

GMC OPENS TRUCK BRANCH.

A Memphis, Tenn., branch has been opened by the General Motors Truck Co. The handsome building formerly occupied by the Hernando Motor Co. has been taken. J. N. Magna, formerly at the St. Louis branch, will take charge of the local office. With him is J. K. Dobs, formerly with the Union Motor Co.



Two of the International Trucks Which Deliver Milk on Schedule at Worcester, Mass., Despite Unusual Storms.



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PAWTUCKET, R. I.

APRIL, 1921.

BOSTON SHOW PUT INDUSTRY INTO PRODUCTION

KNOWLEDGE OF SALES MADE, PROSPECTS LISTED AND INTEREST AROUSED, BASIS FOR DECISION OF FACTORY HEADS TO REVIVE MANUFACTURING—DEMONSTRATED THAT CAR AND TRUCK STILL RULE STRONG IN PUBLIC MIND—DEALERS UNANIMOUS IN DECLARING THAT EVENT WAS A BUILDER OF BUSINESS.

The Boston Automobile Show put life into every branch of the automotive industry.

Its promotive power was exerted at the psychological moment for the generating of the highest possible quota of productiveness.

It repeated what Gen. Sheridan said in the Wilderness: "Turn the other way, boys. We are going back."

It found the ship of industry floating idly on an ebb tide and stirred up a breeze that soon had the vessel plowing steadily along toward the port of achievement.

In no other year was this institution faced with such a mighty task and in no other year did it approach in results its accomplishments of 1921.

Coming into the picture when business was in its last gasp it not only gave first aid, but had the patient sitting up and clamoring for action in no time. It restored lost vigor, instilled new life and put monkey glands into a tottering frame. It revived the industry over night.

The salesman, the dealer, the distributor, and even the stray manufacturer,

who had "sold out" to hard times, losing faith and confidence, was reclaimed and "sold" again on the future of the trade in which his money, time and ability are invested. From the men higher up to the worker in the ranks there was none who could not be proud of the wonderful industry behind the institution which functioned so superbly in Boston March 12-19.

It was well that the truck maker, who needed the biggest dose of optimism, got just that. There was certainly good cheer in such sign as this: "12 of these models sold to the Boston Telegram for delivery purposes;" "this truck sold to So-and-So," etc. Placards telling some such story were on nearly every booth where trucks were shown.

The factory man and every unit in the trade left the Boston show impressed with the solidity and permanency of the basic industry behind such an institution. While the merchandisers of trucks present were confined largely to those from New England and some points in New York state, nearly all the factories from coast to coast were represented.

Made the Wheels Turn.

It might be far-fetched to say that the entire impetus behind the starting of automotive factories almost at once, many on full production, was the Boston show, and the story it told and the atmosphere of prosperity it exhaled. Yet the factory men were there, they saw, they weighed and they measured. Then production began.

It is safe to state that the Boston ex-

hibit did not cause any schedules to be cut. The thousands who fought for admission on the opening day, forcing the doors to be opened ahead of time, and the steady stream which flooded Mechanics' building while the big event had its run, gave unanswerable testimony to the interest in the motor wagon that no depression can down. It proved that the auto era is yet in its heyday. It satisfied the man in the profession that he has builded well. It told the manufacturer that his wares yet swing high in public favor.

If not a car or truck had been sold this demonstration of public interest, this exhibit of what is modern in motor products, this proof of the forward striding trend of the industry, would have been worth while.

Salesmen on the Job.

It was not only the event, the magnificent decorations, the beauty of the automobiles, the power of the truck or the utility of the accessory that bespoke progress. More striking than any of these, in telling the world that the industry is not to be denied, was the on-the-job attitude of the salesmen. They worked at a 100 per cent. clip. No visitor who had the slightest leaning toward the ownership class got away without being drawn nearer the goal. Many who came to see remained to buy. Salesmanship was of the go-getter school.

Noticeable in the truck and tractor section was the advance in knowledge of these units exhibited by the general public. The outlines of the vehicle, the

paint and the trimmings, hardly won a glance. Structural details were always sought and the questions revealed that the visitors knew what they were talking about. This is a factor which should help the cause.

The salesmen gave all necessary time, displayed remarkable patience and dug up prospects where another line of procedure would have been without result.

The salesmen were alert all the time. One did not have to show interest in an exhibit before he was singled out for a talk. Deftly each salesman had a notebook ready to jot down a name and address as he talked. In this way many prospects were obtained. No one had a chance to get away without being given some information about the models. Very often it was possible to get a person who was hesitating a bit to agree finally to buy. And deposits were taken.

An idea of sales may be gleaned from listening to the talks of salesmen as the show was nearing its close. One man said: "In other years we were in the show with little idea of taking orders. We were getting them anyway."

"This year we went out to get orders. And yesterday morning the figures on our blackboard at the salesrooms mounted higher than the day before. We found buyers."

Another dealer remarked: "Every one of these trucks in my exhibit goes to a new owner next week." There were many stories of that nature.

Thousands of Prospects.

In addition to this there were thousands of prospects secured. The salesman managed to get the names and addresses of many who visited their places, and promised to send them literature. They are not going to send these prospects any literature for the children to open and tear up before daddy sees it.

No, indeed. They are going to deliver the literature in person. And they will do it in many cases by driving up to the prospect's home in a truck ready for demonstration or in a car that will bring the prospect to the salesroom.

That is the new era of salesmanship that has been drilled into the motor industry this year. And they are not going to pass over lightly any name. Nor are they looking over a prospect to see if he wears spats or overalls.

For during the week a number of instances were pointed out at sales dinners where a competitor lost a sale by being too particular. Also some of the orders came from people that surprised the man who made a sale.

There will be no rest period coming to New England distributors, dealers and salesmen now that the show is over. Everyone will be out working hard to close up prospects.

One of the interesting things developed was that people after attending the show and looking over cars and trucks were going to the salesrooms to view the service departments and get an idea of what a dealer really could do for an owner before closing an order. So as an indirect result of the show there are sales being made outside.

The show was from every standpoint

TRUCKS AT BOSTON.

Acme	Maxwell
Ajax	Nash
Atlas	Netco
Autocar	Old Hickory
Briscoe	Oldsmobile
Chevrolet	Oneida
Clydesdale	Packard
Commerce	Phenix
C-T Electric	Pierce-Arrow
Cunningham	Rainier
Dodge	Reo
Duplex	Republic
Facto	Sanford
Federal	Selden
Ford	Sterling
GMC	Stewart
Guaranty	Traffic
International	Ultimate
Kelly-Springfield	Velie
Mack	Walker Electric
Maxim	White

more comprehensive and successful than any of its 18 predecessors. Every detail was adequately cared for by Manager Chester I. Campbell and the committees in charge. Nothing was left undone and the industry will reap the reward for the efforts of the men of Boston who staged the event.

Trucks in Basement.

The trucks and tractors were shown in the basement of Mechanics' hall and although somewhat crowded, were shown to good advantage, sufficient room being provided so that interested persons could easily examine the vehicles critically.

Business men from all fields of commercial work, contractors, city and town officials, showed great interest in this exhibit, the department containing a great array of practically every type of commercial, farm and fire motor vehicles manufactured. The models ranged from the 1000 pound delivery to the giant six and eight-ton trucks. Several pieces of automobile fire apparatus suitable for city or suburban service were among the exhibits, while ambulances, hearses and trolley "trouble" vehicles were also displayed.

It is evident also that the truck manufacturer is rapidly increasing the number of his models with the idea of providing a size to suit any demand of business delivery. It should be said, however, that the light delivery type has increased in greater proportion than the heavy duty vehicle.

The Exhibitors.

Harper Libby Co., Inc., 801 Beacon street, Boston, Mass., exhibited a Duplex Four-Wheel Drive Model "A" truck, equipped with a four-cylinder 25.6 horsepower engine, Westinghouse two-unit starting and lighting system and having a wheelbase of 145 inches, selling at the factory for \$2775.

The same company exhibited a Model 70 four-cylinder, 25.6 horsepower $3\frac{1}{2}$ -ton Winther truck priced at \$4200 f. o. b.

Eugene F. Lally & Sons Co., 96-102 Brookline avenue, Boston, Mass., exhibited six Acme trucks having capacities of $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, $3\frac{1}{2}$ and 5 tons, and priced

from \$1790 on the $\frac{3}{4}$ -ton model to \$5190 f. o. b. on the five-ton job.

Commerce trucks were shown by the Commerce Motor Truck Co. of New England, 18 Brighton avenue, Boston, Mass., and included models of the Commerce line showing the new $\frac{3}{4}$ -ton speed truck and the larger $1\frac{1}{2}$ and two-ton jobs.

Commercial bodies were shown by Martin-Parry Corporation, 142-146 St. Mary's street, Boston, Mass.

The Buda Co., Harvey, Ill., exhibited several models of its heavy duty engines for trucks and tractors, which have won such wide recognition in the trade because of their great torque, engine power and economy of operation.

The New England Truck Co., Fitchburg, Mass., exhibited its Netco Model "H," which is equipped with a 40 horsepower four-cylinder engine and fitted with starting and lighting system, optional. The wheelbase of this truck is 170 inches and the price f. o. b. factory \$3800.

The exhibit by the Traffic Truck Sales Corporation, 961 Commonwealth avenue, Boston, Mass., was the one Traffic model, a 4000-C four-cylinder 22.5 horsepower, 4000 pound capacity truck, having a wheelbase of 133 inches. The price of this job f. o. b. factory is \$1595.

The New Britain Machine Co., Chestnut street, New Britain, Conn., exhibited a No. 2 New Britain Tractor, equipped with plow and many other tool attachments, which gained much interest.

Maxwell and Sanford trucks were exhibited by C. E. Fay-Allen Co., 730 Commonwealth avenue, Boston, Mass. The Maxwell truck was the standard model, equipped with 25 horsepower four-cylinder engine, having Auto-Lite and Simms-Huff starting and lighting system, and equipped with regular stake and end gate body, selling at the factory for \$1718.50.

A Sanford $2\frac{1}{2}$ -ton chassis was shown, equipped with 27 horsepower engine, four cylinders, and having a wheelbase of 174 inches. Priced at \$3350.

Three Federal Models.

The Boston Federal Truck Co., 233 Massachusetts avenue, Boston, Mass., exhibited three models of Federal trucks. A model SD, 30 horsepower, four-cylinder truck chassis having a capacity of one ton and a wheelbase of 132 inches equipped with electric lights and selling for \$2500 f. o. b. factory. Model UE, a 35 horsepower truck, having a capacity of two tons, equipped with elevated dumping body, having a wheelbase of 144 inches, the chassis selling for \$3025 f. o. b. A Model WE, 40 horsepower, four-cylinder truck, having a capacity of $3\frac{1}{2}$ tons and a wheelbase of 156 inches. The chassis selling for \$3950 at the factory.

The International Harvester Co. of America occupied two spaces and exhibited three trucks and one tractor. The trucks consisted of the Model S, a four-cylinder 22 horsepower proposition, having a wheelbase of 124 inches, equipped with Northeast starting and lighting system and selling for \$1500 f. o. b. Model G, having a four-cylinder engine of 28 horsepower and a wheelbase of 138 inches, equipped with Northeast starting and lighting system, selling for \$2800

f. o. b.; Model L, four-cylinder, 28 horsepower engine, with wheelbase of 160 inches, selling at \$4500 f. o. b. The International 8-16 tractor, having four cylinders and using kerosene as fuel, selling for \$1210 f. o. b., was a winner of earnest attention.

Sterling trucks were represented by the Sterling Motor Truck Co. of New England, 1031 Commonwealth avenue, Boston, Mass., and the factory, Milwaukee, Wis. Three trucks were exhibited in three spaces as follows: The 2½ ton job is equipped with a four-cylinder engine of 32 horsepower and equipped with electric starting and lighting system, and has a wheelbase of 130 inches, selling for \$3650 f. o. b.; 3½-ton model, equipped with a four-cylinder 42 horsepower engine, starting and lighting system and a wheelbase of 184 inches, and selling for \$4650 f. o. b.; five-ton model, equipped with a four-cylinder, 52 horsepower engine, starting and lighting system, a wheelbase of 196 inches and selling for \$6000 f. o. b.

The Packard Motor Car Co. of Boston, 1089 Commonwealth avenue, Boston, Mass., occupied four spaces and exhibited four of the latest models of Packard trucks.

Model ED is equipped with four-cylinder engine of 32.4 horsepower and has a 15½ foot wheelbase, the chassis selling for \$4525 f. o. b.

Model EC is equipped with four-cylinder engine of 25.6 horsepower, has a wheelbase of 14 feet and the chassis sells for \$3700 f. o. b.

Model V is equipped with four-cylinder engine of 28.1 horsepower, has a wheelbase of 12 feet, the chassis selling for \$4100 f. o. b.

Model X, equipped with four-cylinder engine of 28.1 horsepower has a wheelbase of 14 feet, the chassis selling for \$4175 f. o. b.

Vellie trucks were exhibited by the New England Vellie Co., 80 Brookline avenue, Boston, Mass. Model 34, ½-ton capacity, is powered by a 34 horsepower four-cylinder engine equipped with Auto-Lite starting and lighting system and having a wheelbase of 109 inches, selling at \$1285 f. o. b. Model 46 has a capacity of 1½ tons, is equipped with a 35 horsepower four-cylinder engine, has a wheelbase of 133 inches and sells for \$2200 f. o. b.

Rainier trucks were also exhibited by the New England Vellie Co. The new model R-15, a 3½-ton job, was shown for the first time. The chassis price of this

model is \$4400 f. o. b. and the wheelbase of the chassis is 170 inches. Standard units are used throughout in the construction of this job. The chassis is powered by a four-cylinder 32.40 horsepower Continental engine and is unusually massive in structural details and oversize in many of the units.

Six White Models.

White trucks were exhibited in five spaces by the White Co., 930 Commonwealth avenue, Boston, Mass., six models being shown. These consisted of chassis equipped with bodies that had previously been ordered and were placed in the show to give intending purchasers an idea of the various bodies that could be fitted to White chassis. A White Model 40 truck equipped with a 40 horsepower four-cylinder engine, fitted with starting and lighting system and furniture van body, the chassis having a wheelbase of 205 inches, the outfit selling for \$7600 f. o. b. factory, occupied a very promi-

electric starting and lighting system, and selling at \$4225 f. o. b.

Two Republics Shown.

Republic trucks were shown by the Lebon-Kidd Co., 983 Commonwealth avenue, Boston, Mass., two models 10 and 19, being exhibited. The model 10 is a 22.5 horsepower proposition, equipped with four cylinders, having a capacity of ¾ to one ton, a wheelbase of 124 inches and equipped with Delco lighting and starting system, selling at \$2170 f. o. b., while the second, a model 19, a 2½-ton truck, is equipped with a four-cylinder engine of 27.2 horsepower. This truck has a wheelbase of 144 inches and sells at \$2795 f. o. b.

Flynn Motor Sales Co., 145 Columbus avenue, Boston, Mass., exhibited a Model W Old Hickory truck, equipped with a 22.5 horsepower, four-cylinder engine, the chassis having a wheelbase of 135 inches and selling at \$2538 f. o. b.

Mack trucks were exhibited by the Mack Motor Truck Co., 185 Massachusetts avenue, Cambridge, Mass. Four spaces housed the exhibit, which gave an idea of the principal models sold by this company.

The Automotive Corporation, 40 Court street, Boston, Mass., exhibited an Automotive three-line control tractor, which allows the tractor operator to ride on the machine that is being hauled and operate the tractor with the three lines, steering the tractor through an automotive device and operating the clutch and throttle with the center line.

Walker Electric trucks were exhibited by Walker Electric Co., 592 Com-

monwealth avenue, Boston, Mass., three models being shown. Model L, a two-ton capacity truck, driven by a 4.75 horsepower electric motor and having a wheelbase of 124 inches, selling for \$3992 f. o. b.; Model K, a one-ton capacity truck of 98-inch wheelbase, driven by a 3.25 horsepower motor, the job selling for \$2990 f. o. b., and a Model N, five-ton chassis of 150-inch wheelbase, equipped with 7.50 horsepower motor, price, without body, including war tax, and without battery, \$4200 f. o. b.

The Pierce-Arrow Line.

J. T. McGuire Co., 745 Boylston street, Boston, Mass., exhibited five models of the Pierce-Arrow line, Model X-5, a two-ton capacity truck, equipped with a 25-horsepower, four-cylinder engine, including starting and lighting system and wheelbase of 15 feet, priced at \$3750 f. o. b. Model R-10, a five-ton capacity



View of Boston Show Along the Main Entrance to Mechanics' Building, Showing Details of Luxurious Decorative Setting.

nent position in the exhibit. A model 20 four-cylinder 20 horsepower truck, equipped with starting and lighting system and dump body, listed at \$4775 f. o. b. and having a wheelbase of 145 inches also was shown.

A Model 15 White truck, equipped with panel body, was exhibited, which has a wheelbase of 133½ inches and is equipped with a 20 horsepower, four-cylinder engine, the job selling for \$3500 equipped with electric lights and starter. A second truck of the same model was also shown equipped with lumber body and with Prest-O-Lite starting and lighting system, and selling for \$3200 f. o. b.

The sixth model of the White exhibit was a model 20 truck equipped with furniture body having a wheelbase of 157½ inches and equipped with a 20 horsepower, four-cylinder engine, fitted with



Chester I. Campbell, Secretary, Boston Commercial Motor Vehicle Association and General Manager of Show.

truck, having a wheelbase of 14 feet and equipped with a 35 horsepower, four-cylinder engine, fitted with starting and lighting system, priced at \$5700 f. o. b. Model R-10, with a wheelbase of 17 feet, adapted for a long platform body and equipped with the same horsepower engine as the previous model.

Model W-2, a 3½-ton proposition, having a wheelbase of 16 feet 6 inches and equipped with a 35 horsepower, four-cylinder engine, fitted with starting and lighting equipment, priced at \$4950 f. o. b. A second Model W-2 was an exact duplicate of the previous truck, but equipped with a different style body, priced at \$4950 f. o. b. A noteworthy feature of the Pierce-Arrow line was the engine, which employs 16 valves, and is designed to provide a more flexible power plant and increased power output, with operation that is in every way economical.

First Showing of Ajax.

A truck which was shown for the first time at the Boston show was the Ajax, a one-ton model exhibited by the Ajax Motors Corporation, 15 State street, Boston, Mass. This truck, known as Model



J. W. Maguire, Vice President, Boston Commercial Motor Vehicle Association.

B-1, was equipped with a 22.5 horsepower, four-cylinder engine, fitted with Delco starting and lighting system. The wheelbase of the truck is 134 inches and the price f. o. b. factory \$2250.

This truck is manufactured in Hyde Park, Mass., and standard units are used in its construction. The engine is a Weidley, heavy duty type, having a bore of 3¼ inches and stroke of 5½ inches, and piston displacement of 243 cubic inches. A Stromberg carburetor supplies the gas mixture, the steering gear is Ross manufacture, the transmission Brown-Lipe, as is also the clutch, which is in unit with the engine crankcase. The axles are Timken front and rear, fitted with tapered roller bearings, and the rear axle is a worm type fitted with worm and worm gear.

Pneumatic tires and disc wheels were shown on the Ajax truck, which is considered as standard equipment with this model.

Henshaw Motor Co., 989 Commonwealth avenue, Boston, Mass., New England distributors for Dodge Bros., cars and trucks, exhibited two models of the Dodge. One model, known as the Business Man's Car, was fitted with a standard panel side body, sells for \$1330 f. o. b., and is equipped with 30-35 horsepower, four-cylinder engine, has a wheelbase of 114 inches, the engine being equipped with Northeast starting and lighting system. The second truck was equipped with screen side body and rated at 1000 pounds capacity, selling for \$1270 f. o. b.

Farm Power Display.

The Sowers Tractor and Implement Co., 753 Boylston street, Boston, Mass., exhibited the Beeman Garden tractor, a small hand machine, equipped with a five horsepower, single-cylinder engine, priced at \$365 f. o. b. A Cletrac track-laying type tractor was shown, which is equipped with a 20 horsepower, four-cylinder engine, priced at \$1510 f. o. b. A larger tractor known as the J-T, having a 45 horsepower, four-cylinder engine, was in this exhibit. It is priced at \$3485 f. o. b. The balance of the exhibit was given over to power implements, including Oliver plows, harrows, spreaders and cultipacker.

The Ford Motor Co., 400 Brookline street, Cambridge, Mass., exhibited a Ford one-ton truck chassis, equipped with 20 horsepower engine and fitted with starting and lighting system, which is optional, selling at \$545 f. o. b. A Ford tractor was also shown, equipped with 20 horsepower engine, priced at \$625 f. o. b.

Phenix truck and accessories were shown by the George W. MacBride Co., Inc., 6 Columbus avenue, Boston, Mass., and consisted of a Model T Phenix truck, equipped with 20 horsepower, four-cylinder engine. This truck has a capacity of 1½ tons and a wheelbase of 125 inches.

Oldsmobile trucks were exhibited by the Boston Oldsmobile Co., 940 Commonwealth avenue, Boston, Mass., and consisted of an Oldsmobile truck chassis and a chassis fitted with four-post open express body. The chassis is known as Model T and is equipped with a 21.7



J. A. Hathaway, President, Boston Commercial Motor Vehicle Association.

horsepower, four-cylinder engine, fitted with starting and lighting system, and having a wheelbase of 128 inches and a capacity of one ton. The price of the chassis is \$1500 and of the four-post express job \$1600 f. o. b. factory.

Chevrolet trucks were shown by the Chevrolet Motor Co. of New England, 27-31 Huntington avenue, Boston, Mass., and three models were exhibited. Model T was shown complete and is equipped with a 21.7 horsepower, four-cylinder engine, fitted with Auto-Lite starting and lighting system and has a wheelbase of 125 inches, selling for \$1545 f. o. b.

Model G, a 1500-pound truck, is equipped with 21.7 horsepower, four-cylinder engine, Auto-Lite starting and lighting system, 120-inch wheelbase, and sells for \$1095. Model 490, a light delivery job, is equipped with 21.7 horsepower, four-cylinder engine, Auto-Lite starting and lighting system, has a wheelbase of 102 inches and sells for \$820 f. o. b.



Day Baker, Treasurer, Boston Commercial Motor Vehicle Association.



J. H. MacAlman, Director, Boston Commercial Motor Vehicle Association.

Day Baker Co., Inc., 110 Arlington street, Boston, Mass., exhibited two Oneida trucks, a Model 2E, a two-ton job, equipped with electric motor, having a wheelbase of 111 inches and selling for \$2850 f. o. b. Oneida Model D9, equipped with 50 horsepower, four-cylinder engine, a 3½-ton job, having a wheelbase of 170 inches, equipped with starting and lighting system and selling for \$4580 f. o. b.

Six Stewart Models.

The Stewart Automobile Corporation, 603 Newbury street, Boston, Mass., exhibited six models of Stewart trucks. Model 11 a ¾-ton job, equipped with 30 horsepower, four-cylinder engine, having a wheelbase of 114 inches and Eisemann starting and lighting system and selling for \$1350 f. o. b. Model 12, a ¾-ton job, equipped with 35 horsepower, four-cylinder engine, having 130-inch wheelbase, Eisemann starting and lighting system and selling for \$1750 f. o. b. Model 9, a 1½-ton job, equipped with 40 horse-



N. H. Halliday, Director, Boston Commercial Motor Vehicle Association.

power, four-cylinder engine, special starting and lighting system, having a wheelbase of 145 inches and selling for \$2200 f. o. b.

Model 11, a two-ton truck, equipped with 45 horsepower, four-cylinder engine, special starting and lighting system, and wheelbase of 156 inches, selling at \$2800 f. o. b. Model 7X, a 2½-ton job, equipped with 45 horsepower, four-cylinder engine, special starting and lighting, 174-inch wheelbase and selling at \$2950 f. o. b. Model 10, a 3½-ton job, equipped with 55 horsepower, four-cylinder engine, special starting and lighting system, having a wheelbase of 185 inches and selling for \$3850 f. o. b.

C. P. Rockwell, Inc., 640 Commonwealth avenue, Boston, Mass., exhibited three models of Nash trucks, two two-ton models and a one-ton model, as well as two models of the Troy trailer, which the company also distributes. Nash trucks consisted of model 2018, a 40 horsepower, four-cylinder, one-ton job, having a wheelbase of 130 inches, equipped with Auto-Lite starting and lighting system and selling for \$1895 f. o. b.; Model 3018, a 40 horsepower, four-cylinder two-ton job, equipped with Auto-Lite starting and lighting system, having a wheelbase of 168 inches and selling for \$2600 f. o. b.; Model 4017, a 48 horsepower, four-cylinder, two-ton job, having a wheelbase of 168 inches and selling for \$3300 f. o. b.

The GMC Exhibit.

Noyes Buick Co., 857 Commonwealth avenue, Boston, Mass., exhibited two models of the GMC trucks, Model K 16, a 22.5 horsepower, four-cylinder, one-ton truck, equipped with high-tension magneto and having a wheelbase of 132 inches, selling for \$1995 f. o. b., and Model A, a two-ton job, having a wheelbase of 158 inches, equipped with 27.2 horsepower, four-cylinder engine, and selling for \$3100 f. o. b. factory.

The Linscott Motor Co., 566 Commonwealth avenue, Boston, Mass., exhibited a Model F Reo truck, which has a capacity of 1¼ tons. The engine has 27.2 horsepower and is a four-cylinder type, manufactured by the Reo company, being equipped with Remy starting, lighting and ignition, the job selling for \$1575 f. o. b.

The Autocar Sales and Service Co., 642 Beacon street, Boston, Mass., exhibited five models of Autocar trucks, two models showed the extreme ruggedness of the new heavy duty truck equipped with 28.9 horsepower, four-cylinder engine, one of the trucks having a wheelbase of 156 inches and the second, equipped with dump body, and having a wheelbase of 120 inches. The price of the former is \$4500 f. o. b. and of the latter \$5600 f. o. b. The three other models, two of the 31 UF and one 21 UG, powered by a two-cylinder, 18 horsepower engine, having a wheelbase of 97 inches, were equipped with coal dump and rack bodies, selling for \$3300, \$3150 and \$2800 respectively.

James Cunningham Son & Co., 1117 Commonwealth avenue, Boston, Mass., exhibited two models, one a hearse, Model 66 A, and the second an ambu-



C. P. Rockwell, Director, Boston Commercial Motor Vehicle Association.

lance, Model 68 A, both bodies mounted on the same type chassis and equipped with the same horsepower engine. The price of the former is given as \$5300 and of the latter \$5700 f. o. b. factory. Power is furnished by an eight-cylinder, 45 horsepower engine, fitted with Delco starting and lighting system, and having a wheelbase of 141 inches.

Big Kelly-Springfield Line.

Kelly-Springfield trucks were well represented by the Kelly-Springfield Motor Truck Co., 596 Commonwealth avenue, Boston, Mass., five models being shown.

Model K 32, equipped with 30 horsepower, four-cylinder engine, is a 1½-ton proposition, having a wheelbase of 144 inches and selling for \$2900 f. o. b.

Model K 36, equipped with 30 horsepower, four-cylinder engine, is a 2½-ton job, having a wheelbase of 144 inches and selling at \$3250 f. o. b.

Model K 41, equipped with 40 horsepower, four-cylinder engine, has a capacity of 3½ tons, a wheelbase of 156 inches and sells for \$4200 f. o. b.

Model K 50, equipped with 45 horsepower, four-cylinder engine, has a ca-



P. S. Aultman, Director, Boston Commercial Motor Vehicle Association.

capacity of five tons, a wheelbase of 150 inches and sells for \$4900 f. o. b.

Model K 60, equipped with 45 horsepower, four-cylinder engine, has a capacity of six tons, wheelbase of 150 inches and sells at \$5100 f. o. b.

The Eastern Electric Vehicle Co., 179 West First street, South Boston, Mass., exhibited a model of the Eastern Electric truck, known as model BR4, which has a capacity of two tons, a wheelbase of 116 inches and sells for \$2800 f. o. b.

Four Selden Models.

Baker Motor Sales Co., Inc., 400 Massachusetts avenue, Cambridge, Mass., exhibited four models of Selden trucks.

Model A 5 is powered by a four-cylinder 36.1 horsepower engine, while the truck has a capacity of five tons, and a wheelbase of 164 inches regular or an optional wheelbase of 192 inches, and sells for \$5600 f. o. b.

Model A 3½, is equipped with 32.4 horsepower, four-cylinder engine, has a capacity of 3½ tons, a wheelbase of 162 or 190 inches and sells for \$4175 f. o. b.

Model 2½ is equipped with 27.2 horsepower, four-cylinder engine, has a capacity of 2½ tons, a wheelbase of 145 or 165 inches and sells for \$3425 f. o. b.

Model 1½ is equipped with 22.5 horsepower, four-cylinder engine, has a capacity of 1½ tons, wheelbase of 137½ inches and sells for \$2360 f. o. b.

Facto Motor Trucks, Pecousis Blvd, Springfield, Mass., exhibited a model of the new Facto truck, which was exhibited in Boston for the first time. The sales policy of this company is to market the truck direct to the customer by mail. The Facto truck is 2½-ton job, equipped with 40 horsepower, four cylinder engine, priced \$2895 f. o. b.

New Clydesdale Shown.

Clydesdale trucks were shown by the Holland System Trading Co., 949 Commonwealth avenue, Boston, Mass., four models being on display, including the new one-ton truck which was recently added to the line. Model 21, is equipped with 19.6 horsepower, four-cylinder engine, Bijur starting and lighting system, has a wheelbase of 130 inches and sells for \$1860 f. o. b.

Model 45.3 is a 3½-ton job, equipped with 45.3 horsepower, four-cylinder engine, has a wheelbase of 170 inches and



General View of the Passenger Car Department at Boston Show, Showing Galleries Where Cars and Accessories Were Also Displayed.

sells for \$3540 f. o. b.

Model 42 C, a 1½-ton job, is equipped with 38.2 horsepower, four-cylinder engine, has a wheelbase of 154 inches and sells for \$2750 f. o. b.

Model 20 C, a ¾-ton truck, is equipped with 32 horsepower, four-cylinder engine, has a wheelbase of 136 inches and sells for \$1890 f. o. b.

The Atlas Model 20 was also exhibited by the Holland System Trading Corporation. This truck has a capacity of one ton and a wheelbase of 130 inches. It is equipped with a four-cylinder Lycoming engine of 19.6 horsepower.

Ultimate trucks were exhibited by Arthur G. Johnson, 45 Lansdowne street, Cambridge, Mass. Model A, a two-ton job, equipped with 26.7 horsepower, four-cylinder engine and having 144-inch wheelbase, sells for \$3200 f. o. b., and a Model BL, a three-ton proposition, equipped with 29.8 horsepower, four-cylinder engine and having a wheelbase of 178 inches, is marketed at \$3850 f. o. b.

The Maxim Motor Co., Middleboro, Mass., exhibited a Maxim Fire truck, which proved of great interest to fire department chiefs. The truck is powered by a 90 horsepower, six-cylinder engine,

fitted with Westinghouse starting and lighting system, has a wheelbase of 162 inches and sells at the factory for \$11,500 f. o. b.

Johnson's Country Life Body for the Ford chassis was exhibited by Henry L. Johnson, 516 Atlantic avenue, Boston, Mass.

Springfield bodies were shown by the Springfield Commercial Body Co., 80 Charles River road, Cambridge, Mass.

Sewell Cushion Wheels were exhibited by the Sewell Cushion Wheel Co., 584 Commonwealth avenue, Boston, Mass.

Babcock Commercial bodies were shown by the Babcock Sales Co., 1123 Commonwealth avenue, Boston, Mass.

Martin-Parry Corporation, 142-146 St. Marys street, Boston, Mass., exhibited a full line of commercial bodies for the Ford one-ton truck and the 1000-pound delivery vehicle.

Every unit vital in the highway transportation of freight was shown and was seen by tens of thousands of people. The exhibition again proved that the truck and the car belong together when on public display, that the interests of both may be fully furthered. The auto display attracted a host who strayed into the basement and were won over to the truck as a modern freight hauler. There were not a few who came to see the array of truck equipment and who were drawn to a car they had no idea of owning when they left home. Of the two branches of the automotive industry there is no doubt, however, that the truck benefits most by a merged exhibit.

The makers of trucks, equipment, parts and accessories had nothing to be ashamed of when compared with what the car manufacturers had to offer, although the latter showing was admittedly the last word in that line. The truck of today is the perfect hauling unit.

More than 200,000 people attended the Boston show. A high percentage of these saw the modern motor truck at its best. The sales actually made are but a slight factor in the good the industry will reap from this demonstration. The best is yet to come.



Showing Typical Accessories Exhibits in Departments F and G.

Show Built Business, Say Boston Dealers.

Business Coming Back.

The show opened very favorably and the weather continued favorable throughout the week—it being better than any week since we have been running the Boston shows.

The attendance was a very good average, in fact, the cash receipts were fully larger than they were last year and showed a falling off of the trade tickets. This showed that the automobile dealers were economizing. The crowd seemed to be of a buying nature, and I believe there were more good prospects for the salesmen to work on received at this show than at any one in the past, as the sales department seem to be getting on their toes and going out for business, which seems to be the only way to get it at the present time.

The sales record would rather show that there was a less falling off on the high priced and medium priced cars than in the more moderate priced ones. This might show that the wage earner was economizing and preparing for what he sees in the future.

The writer believes that the real moneyed values of cars sold in 1921 will far exceed that of 1920. The 1920 sales were very much increased by the feeling that the shortage of cars was going to make it harder to get them later. For 1920 our own sales showed 24 orders; of these the records show only 12 were delivered, showing that the salesmen had taken orders for cars which were impossible for us to deliver. I think this probably is a fair sample of what is being done by others during the show. This year the orders taken were 15 and two of these were rejected for the allowance offered by the salesmen, and not accepted by the used car department, leaving 13 orders, which we have cars to fill, and which will make it about as good as last.

The only difference between this year and last year is: Last year we were short of cars and felt as though we were doing a rushing business and could do a lot more if we had the cars, and this year we are practically overstocked and, consequently, feel as though there is nothing moving.

There seems to be a feeling among the dealers that there has to be a greater effort made as the time has passed when we do not have to go out and ask for the business.

The writer believes there is a rift in the clouds and that business through New England is slowly coming back.—J. H. MACALMAN, President, BOSTON AUTOMOBILE DEALERS' ASSOCIATION; director, BOSTON COMMERCIAL MOTOR VEHICLE ASSOCIATION.

Live Prospects and Orders.

While we have been exhibiting in the Boston Motor Truck Show annually since 1910 (I believe the auto show just closed will make our 12th yearly exhibit), it was the unanimous expression of our several sales managers that they had received more live prospects, more orders and more honest-to-goodness indications of real buying during the show just closed than they had witnessed in years.

As our Mr. White stated during the show, we started in Monday morning taking orders, our dealers did a nice business, and all in all our salesmen received unusual encouragement pointing to a good spring business. Unless all signs fail we shall experience a gradually increased buying from now on. Taking into consideration the strict buyers' market which now exists, the like of which we have not experienced since 1910, we are extremely glad to state that the 1921 Boston Truck Show was a great success and gratifying beyond our expectations.—J. S. HATHAWAY, New England Manager, THE WHITE CO.

Great Interest in Trucks.

Never before have we seen public interest centered to such an extent in trucks as during the Boston show. Aside from closing several spot cash sales during the week for heavy duty trucks, we obtained a wonderful list of prospects, with the result that our salesmen are now cashing in and each day are closing sales with prospects obtained at the show.

The new $\frac{3}{4}$ -ton worm drive Clydesdale Clipper created no end of attention and much favorable comment from all sources. Never before have we received so many direct inquiries from prospects in outlying territory and from Maine, New Hampshire and Vermont as during the past week.

We are fully satisfied that the corner has been turned and that truck sales will show a substantial and marked increase from now on. We can safely round it up in one small package by saying that public interest and attendance at the Boston show exceeded our fondest expectation by 100 per cent.—RALPH G. CALEF, Manager, HOLLAND SYSTEM TRADING CORPORATION, CLYDESDALE TRUCK DEPARTMENT.

Most Successful from Business Standpoint.

This year the Boston show was the most successful from a business standpoint, in our experience. We sold during the week of the show 74 cars and trucks, a total business of \$363,997.

The outlook for the next few months, at least, would seem to us extremely bright in the automobile industry, and we are hoping that the improvement in condition will continue throughout the year.

Our sales at the show included 24 bona fide orders with deposits for Packard Twin Sixes, and our sales of the new Single Six car, which is meeting with tremendous public approval because of its low price and economy of operation, would certainly have been three times the 27 we did sell, had we been able to promise earlier delivery. Our sales at the present time are far in excess of the supply.—ROBERT B. PARKER, Vice President and General Manager, PACKARD MOTOR CAR CO. OF BOSTON.

Show Acts as a Stimulus.

During the show we took a great many orders and our local salesmen got a great many new prospects that they were not

working on. Furthermore, our dealers throughout New England who attended the show with us were also able to close up some sales and to sum it all up we feel that the show acts as a stimulus and does do a lot of good not only from the standpoint of retail sales, but for the dealers through New England as well, as our prospect list shows that people call on us from all points of New England.

In regard to the future business outlook we feel, and it is already showing, that business is picking up and will continue so for about two months. We look for a very quiet summer, but around the middle of October I believe that things in general will be fairly well settled and that from then on the truck business will be the biggest in its history and will continue so for several years.—H. ROSS MADDOCKS, President, STEWART AUTOMOBILE CORPORATION.

Sales Are Above Normal.

Our sales during the recent automobile show were within 10 per cent. of our biggest year and the few days following the show indicate even bigger business. This means that our sales are above normal.

Business in Dodge Brothers cars in our territory is not so markedly seasonal as may be the case with other cars in other places. We aim to do a large volume every month, although at the close of our fiscal year we had over 400 unfilled retail orders for spring delivery on our books and this number has increased considerably since.

But we are dealing in a staple and we look for continually increasing business, which the number of orders for immediate delivery taken at the automobile show seems to forecast with emphasis.—ROBERT S. RICHEY, Sales Promotion Director, HENSHAW MOTOR CO.

Show Highly Successful.

From the Ford Motor Co.'s standpoint the Boston show was highly successful, more actual orders having been written this year than at any previous one.

The crowds at the show were tremendous and indications from all sources would tend to signify that business will be entirely satisfactory, particularly on low priced cars.—R. R. JONES, Manager, Cambridge Branch, FORD MOTOR CO.

Sales Were Encouraging.

We were very much pleased and encouraged by actual sales made, prospects created and all-around interest shown by dealers and prospective purchasers at the recent automobile show.

Not only were actual sales made, but the number of prospects received were far beyond our expectations. It is the writer's opinion that the business as a whole, both passenger cars and trucks, will have a healthy, steadily increasing volume from now on.—WM. HOLLINGSWORTH, AJAX MOTORS SALES CO.

Great Opportunity to Meet Trade.

We are very much satisfied with our efforts to get from the exhibit which we made at the show the most satisfactory results.

Reviewing the situation now that the show is over, we feel very much satisfied with what we have accomplished. Even though we did but very little actual business, we found an opportunity there to talk with a great many of our very best prospects and getting an idea of their views on the situation as far as the possibility of purchases in the near future are concerned. Most of them talked very encouragingly.

Some new prospects were developed, but naturally few, as we are covering the territory very carefully and feel that we are very well posted on most of the possibilities there are in this section, as our salesmen are working with all the energy at their command.

Naturally the commercial vehicle people have not the opportunity at the Boston Automobile Show of closing business in any such way as the passenger car dealers have, and the show has never been a place where any great amount of business was done.

The most it amounts to with us is advertising and, as we have said before, it gives us an opportunity of meeting our trade and to meet them on rather different ground and talk from a slightly different angle than when you call on a man during business hours while he is very busy with his own affairs and usually has but little time to give to salesmen representing motor truck interests.—G. H. HUDSON, Branch Manager, WALKER VEHICLE CO.

Sales Exceeded 1920.

We are glad to be able to state that our sales record for the automobile show—and pre-show—weeks of 1921 exceeded our sales for the similar period of 1920 by such a margin that we can confidently predict a record breaking March for this year.

In connection with the automobile show this year we ran a special advertising campaign which, combined with the show, has netted us several thousand more live prospects than we have ever had before. We are expecting big things from the future.

From every indication the Commercial Motor Vehicle show was a success. As to the exact number of sales I am not in a position to state, but I have reason to believe that they were gratifying to all of the executives. Without doubt they had one of the best exhibits that the commercial dealers have ever had in New England and the attendance was all that could be asked for. Indications point to a very successful and profitable coming year's business. I can only quote "1921 will reward the fighters."—L. B. SANDERS, DUNBAR, SANDERS, INC.

Results Satisfactory.

"Results were quite satisfactory and conditions are really looking quite favorable."

ARTHUR G. JOHNSON, NEW ENGLAND DISTRIBUTOR ULTIMATE MOTOR TRUCKS.

Sold a Number of Trucks.

The Boston show, from a point of attendance, was one of the greatest the writer has ever attended. The business was not as great at this show as at some

of the previous shows, yet we were able to sell a number of trucks and at the same time get quite a number of good prospects who will purchase trucks later in the year. We would liken this show to the one in 1915, from a point of business. We also believe that the worst is over, and that business in all lines, including the truck, will go forward at a good healthy growth in the future.—P. S. AULTMAN, Manager, KELLY-SPRINGFIELD MOTOR TRUCK CO.

Satisfactory in Tractor Prospects.

The Boston show was a very satisfactory one for us in many ways. We made several direct sales and got in touch with several hundred live prospective users who are in the market for a tractor of this sort and are waiting for spring work to open up and for a demonstration to be given them on their places.

The interest at this time confirms our belief that land is bound to be worked, crops raised and farms of various sizes and classes are looking for machinery to do their work efficiently.—E. T. GLASS, NEW BRITAIN MACHINE CO.

Business Better Than Since Last July.

Our business in actual sales was better during the show week than any week since last July. Prospects are much better; in fact, it seems that we should actually get more business this coming month than for the corresponding period last year.—H. E. WHITTEN, BOSTON FEDERAL TRUCK CO.

MOTOR SHOW MEANT MORE TRUCK SALES.

Given Moore, New England sales manager for the Traffic truck of St. Louis, who is making his headquarters in Boston, has been making a trip through the territory visiting his dealers and spending some time at the different motor shows in the various cities the past few weeks.

"These dealers tell me that with spring really here they are now beginning to pick up business, for the men identified with transportation and others seeking to enlarge their sphere of usefulness realize that the motor truck is indispensable. As a result of the motor shows in Boston and other New England cities we have been able to send to St. Louis a fine bunch of orders for immediate delivery, so that our trucks will be much more noticeable on the roads than ever in the near future.

"We are glad to say that the Boston Auto Show, this month, demonstrated most conclusively to us that the business outlook for the year is sound and offers every indication of a successful season. Sales were slow during the first two or three days, and the interest of the visitors seemed to be superficial and not as keen as might be expected of prospective purchasers. As the show progressed, however, business came back into its own with enthusiasm, many prospects were added to our lists and sales leaped up to the standards of the best previous years.

"Much uncertainty naturally prevailed before the show and people were warned

against placing their expectations too high; but when the actual results are kept in mind in the light of what was expected, the show may be considered as far outdistancing previous ones.

"The conclusion we draw is that business in general is surely 'coming back,' if indeed it is not already here, and with the volume we have consistently maintained, we expect the present season to be very full of good business."—C. J. Andrews, Sales Manager, Linscott Motor Co. Reo distributor.

SALES AT OMAHA SHOW.

The Omaha, Neb., show, March 14-19, proved a selling event and accelerated business in that section to a remarkable degree. All attendance records were smashed. There were 17 truck exhibits and this end of the show came in for big attention. That it was the right kind of interest was evidenced in the unusual number of sales and the host of prospects lined up. There were signs of prosperity on every hand and dealers wound up the week in good spirits and high confidence in the future.

COMING EVENTS.

April 20 to 23—Goldsboro, N. C.—Second Annual Show. Wayne Warehouse (90x300 feet). Passenger Cars, Trucks, Tractors and Accessories. W. C. Denmark, Secretary, Care of Chamber of Commerce.

April 21 to 23—Lincoln, Ill.—Annual Show, Under Auspices of the Logan County Automobile Dealers' Association. Tented Exhibit. Passenger Cars, Trucks, Tractors and Accessories.

April 25—New York City, N. Y.—Eastern Automotive Equipment Association. Meeting. R. A. Picard, Secretary. Care of A. J. Picard & Co., New York.

May 17 to 19—Buffalo, N. Y.—Spring Meeting of the Service Managers of the National Automobile Chamber of Commerce, Iroquois Hotel. H. R. Cobleigh, Secretary.

May 24 to 28—West Baden, Ind.—Semi-Annual Meeting of Society of Automotive Engineers at the West Baden Springs Hotel.

June 13 to 16—Detroit, Mich.—Annual Convention of National Team and Motor Truck Owners, Inc., Held Aboard Ship During a Cruise on the Steamship Naronic. F. L. Henk, Secretary, 92 Fort Street, W. Detroit.

September—Sacramento, Cal.—Seventh Annual Show During State Fair. Automobile Tent (30,000 Square Feet). Passenger Cars, Trucks, Tractors, Accessories and Agricultural Implements. State Agricultural Society, Sacramento.

September (Two Weeks)—Topeka, Kan.—Sixth Annual Show. Motor Hall at Fair Grounds (16,000 Square Feet). Passenger Cars, Trucks and Accessories. W. H. Imes, Chairman, 11th and Kansas Ave.

Something like \$300,000 worth of automotive products were exhibited at the Fairmont, W. Va., show, including 53 passenger cars and five trucks.

Holding What Has Been Won

Business is middlin'.

Let the industry hold tight to what it's got.

Go after more, but never lose the grip on what's in hand. Remember that "them that has, gits."

The race for business today is like a tug-of-war. When a team gains a few feet it makes that few feet good, gets its breath and then goes after more. But it always "makes good" the few feet first.

The winning fighter never takes a backward step.

Yesterday's production of trucks, tires, parts, equipment and accessories was at least double what it was on the same day in March. A number of factories are in full production. All have jumped their daily output in the past few weeks. All schedules are being revised upward.

This forward movement is not founded on theory. It is being made in response to actual demand in the market. Trucks are being bought and sold.

The call for transportation facilities is an aftermath of improved business conditions. Industry in general is recuperating. The buyer's strike is on its last legs. The harbingers of spring are the harbingers of better business. The outdoors life cries for new clothing, builds stronger appetites and booms commerce. Goods must be moved. The truck's the best mover there is.

Federal reserve boards, financiers, economists, statesmen, are as one in agreeing that the tide has turned and that the volume of business is to steadily mount toward the pre-war peak.

The trade recognizes it. The writer dropped in on three dealers in the past 48 hours and was "showered" with a cigar in each instance. Passing the stogies means that the truck merchant is no longer "passing the buck." He's busy and getting busier.

The automotive trade has had the impetus of 50 shows at widely scattered points, delving into every niche in the land. Not a failure was registered among these events. The Boston and Detroit shows of a few weeks back struck a trip-hammer blow at depression. The industry is itself again. Let's keep it so.

The manufacturer and the merchant must work together as never before to hold what has been won and to keep edging along toward a higher mark. The factory must back the dealer right up to and into the consumer's garrage. The two must cooperate and work as a team to get anywhere.

The manufacturer must advertise, thereby adding many salesmen to the distributor's staff. He must give his dealer the benefit of his trained executives on problems of size. He must keep his agreements even to the punctuation marks. His activities will set the pace for the dealer. If he wobbles the men who handle his product will hardly hew to the line.

The dealer must give the same loyalty to the factory he expects from those whom he employs. He must uphold the prestige of his product and allow none under him to use methods not in keeping with the quality article he merchandises. He, too, has a contract to keep and he must observe it in spirit and word. He must dig and keep his men digging.

The same efficiency and economy which characterizes the unit the industry markets must be practised by those who make and sell it. The loafer and idler does not fit today. Nor is there a place for the squanderer, remembering always that money well spent is a hard working agent for its owner.

The writer called on a New York distributor the other day and found him ensconced in a huge room in a building in the heart of the city's principal street. There was but one desk in the office and enough idle space for an aeroplane landing field. The rent for the area this man occupied would pay a highly trained staff of sales engineers. To our mind this kind of "show" is squandering.

The automotive business is middlin'. Improvement is certain. But the industry's feet should be on solid ground, at the point where they now rest, before the attempt to advance is made. A community of interests, a solid front, a general surge forward and then the permanent footing of the pre-war era.

TRUCK, TRACTOR, TRAILERS DO BIG JOB

The newly inaugurated system of transporting sugar beets from the field to the factory, used by the Anaheim Sugar Co. of Anaheim, Cal., is as efficient as it is novel. The feasibility of using motor trucks for this purpose has long been a subject for conjecture and it remained for the Anaheim company to conduct the initial experiments. A 3½-ton Mack truck, used as a tractor, and six trailers are employed in the work. When the beets have been dug and topped a caterpillar tractor hooks on one or two trailers and drags them between rows in the field. Here the trailers are loaded and drawn to the highway, where the Mack couples them up and takes them to the dumping station shown in the illustration. While the truck is making delivery other trailers are being filled, so that the process is continuous.

Because the old dumping facilities used for horse drawn vehicles were totally insufficient to meet the requirements of motor apparatus, a new type of dumping arrangement was devised. It is constructed so that when the Mack arrives with the loaded trailers it is driven over a platform built on a cradle which permits the entire trailer to be elevated on one side, its load dropping into a chute. This chute empties the beets into a huge revolving wheel.

The beets are carried around on the wheel to free them from dirt, and when they reach the top they drop into a hopper, where they are automatically weighed and then discharged direct into a waiting freight car. The dirt removed from the beets is discharged by a blower back into the trailer and returned to the field.

15 Tons in 45 Minutes.

By means of this system provision is made for dumping, cleaning, weighing and loading in cars, all in one operation. Each trailer has a capacity of from six to eight tons. With sufficient labor to harvest and load, 15 tons of beets can be handled every 45 minutes. The round trip distance over which the equipment runs is 14 miles. Making all necessary allowances, a nine-hour day will permit

eight trips of 15 tons each, or a daily delivery of 120 tons, a figure which far exceeds anything anticipated at the time the project was first contemplated.

This modernized method of handling sugar beets means total motorization of equipment. According to the procedure in use by the Anaheim company the beets are dug by means of a special sub-soil plow drawn by a tractor. As yet no improvement over the old hand method of topping the beets has been devised, so this practise will continue.

The complete plant of handling as it is now being applied is the result of considerable experimentation and preliminary demonstrations on the part of Edward Stark, representing the Anaheim company; F. C. Rulon of the Mack-International Motor Truck Corporation, at Los Angeles, and William Sleddon of the trailer company. The preliminary tests and experiments were conducted in the vicinity of Harbor City, Cal.

TRUCK HAS BIG INNING AT PRODUCTIVE DETROIT SHOW

Detroit's 20th automobile show struck a blow at trade depression in that territory. All attendance records were shattered and there were so many exhibits that an "annex" show was put on across the street from the main performance. Something like \$2,000,000 worth of automotive products were on view, including over 300 cars, about 100 trucks, a few tractors and a mammoth array of accessories. There were 67 different makes of cars, 20 of trucks and 46 accessory firms represented. Many prospects were listed and a generous number of sales made.

Tuesday was Ship-by-Truck day and it was started with a parade, which included every type of commercial vehicle from the light ¾-ton to the seven-ton heavy duty truck. The parade was led by the Dodge Brothers' band and an

escort of motorcycle police. Motion pictures showing motor trucks on the highways were screened continuously on Tuesday in the main auditorium. This feature attracted many motor truck dealers, operators, shippers and others interested in highway transportation.

The truck exhibitors were:

Acason, Acason Motor Truck Co.
Baker-Industrial, Wm. F. V. Neuman & Sons.
Bethlehem, Ralph F. Schneider Truck Co.
Chevrolet, Chevrolet Motor Co.
Commerce, Frank M. Foster Truck Co.
Denby, Denby Motor Truck Co.
Dodge Brothers, Thos. J. Doyle.
Duplex, Frank M. Foster Truck Co.
Federal, Thompson Auto Co.
Ford, Ford Motor Co.
GMC, Owen & Graham Co.
Gramm-Bernstein, Ralph F. Schneider Truck Co.
Kalamazoo, Frank M. Foster Truck Co.
Kelly-Springfield, Arthur H. Murray.
Nash, Nash Distributing Co.
Packard, Packard Motor Car Co.
Paige, Paige Sales & Service Co.
Pierce-Arrow, Wm. F. V. Neumann & Sons.
Reo, Reo Motor Co.
Signal, L. F. Mullin Co.

"THE MODERN MOTOR TRUCK."

Maj. Victor W. Page, member of the Society of Automotive Engineers, former engineering editor of *MOTOR TRUCK*, author of "The Modern Gasoline Automobile," "The Ford Model T Car," etc., and a recognized authority on automotive engineering, has struck a popular cord by preparing and offering to the trade through the Norman W. Henley Publishing Co., 2 West 45th street, New York city, a work which tells to the last word the story of the motor truck.

This book is entitled, "The Modern Motor Truck, Design, Construction, Operation, Repair, Commercial Applications." It is complete in every detail. There is no mysterious technical phraseology. All that the truck owner, chauffeur, traffic manager, shop superintendent, truck salesman and mechanics and repair man needs to know is unfolded in such simple language that the novice may become an expert overnight. The book is illustrated with 528 specially made engravings, which, like the printed word, are clear even to the uninitiated.

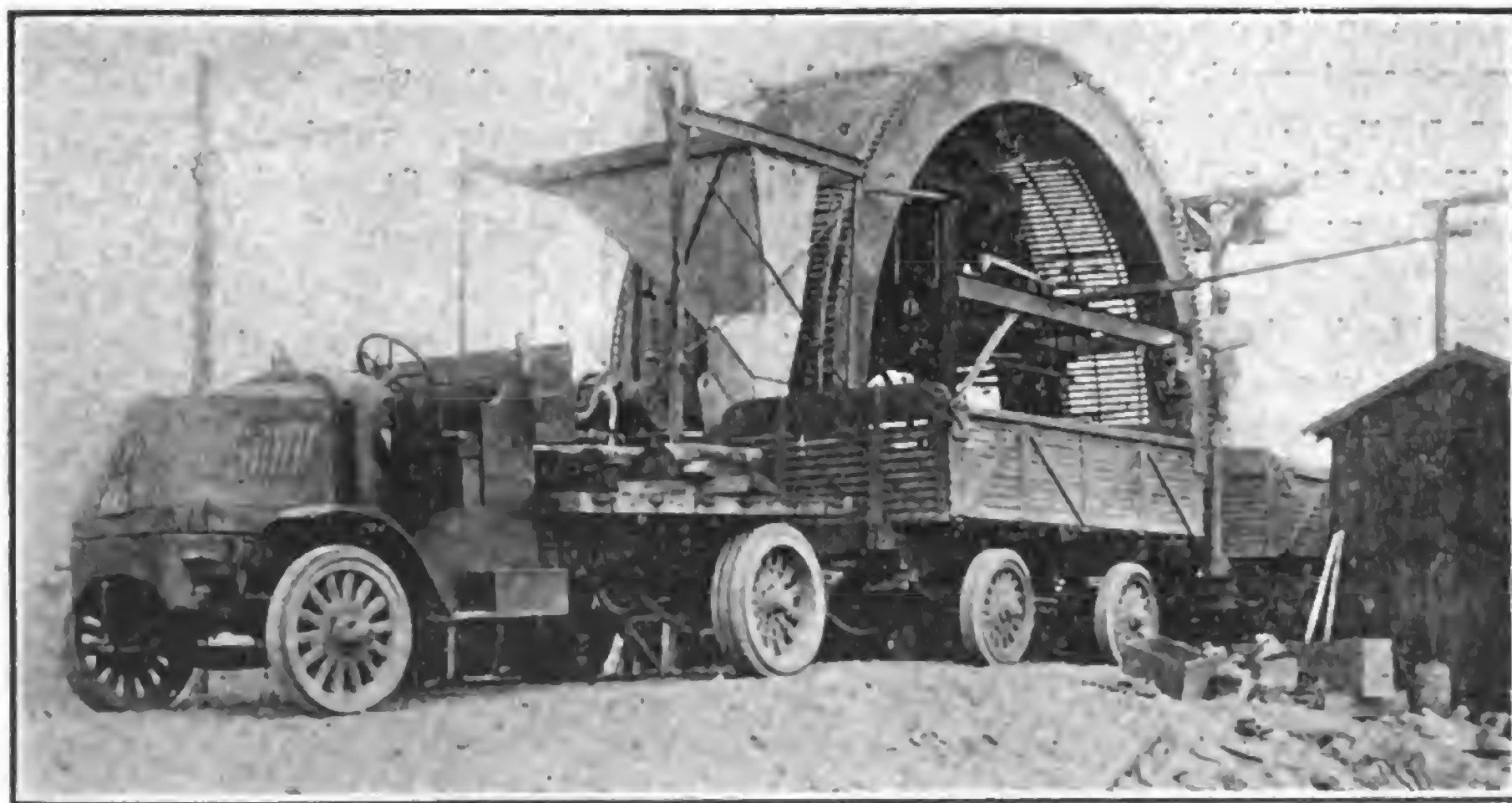
"The Modern Motor Truck" carries an appeal to all interested in modern highway transportation.

FRANKLIN TRUCK LATER.

The Franklin Automobile Co., Syracuse, N. Y., has not abandoned its project to produce an air cooled one-ton truck. Experimental work, which is well along, will be continued at a later date.

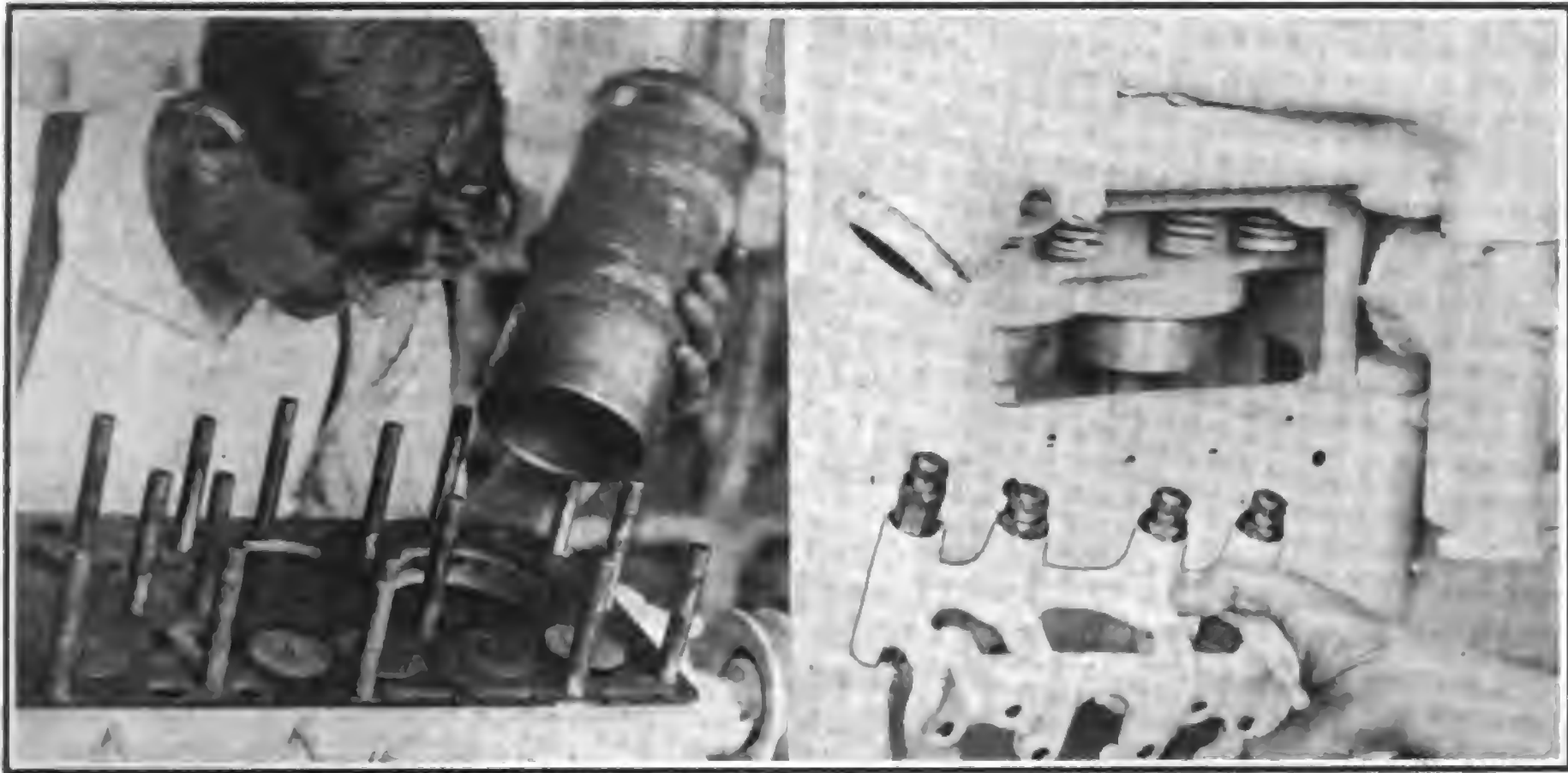
NEW COLUMBIA PLANT.

The Columbia Body Co., Detroit, is to start production of commercial bodies and truck cabs soon in a new plant at Ford City, Mich., where 200 men will be employed.



Mack 3½-Ton Truck with Trailers and Revolving Wheel, Into Which Trailer Loads of Sugar Beets Are Automatically Unloaded.

REDESIGNED POWER PLANT IN G. M. C. IMPROVED "K" SERIES



Renewable Cylinder Walls and Removable Tappet Assemblies Featured in Newly Designed GMC Heavy Duty Engine.

THE General Motors Truck Co., Pontiac, Mich., is in the market with its new Series "K" for the 1921 season and the improvements and fittings in the mechanical and power units put the strongly established product of this company on a higher plane than ever.

The most notable improvement is, in the power plant, which has been redesigned and many new features incorporated which tend to make the trucks even more economical of fuel and oil and more readily accessible for adjustments or replacements, as well as increasing the power developed by the power unit.

In addition there are many minor refinements such as electric lighting systems and pressure gun lubrication of the chassis, with increased strength of frames and other units. The 1921 line comprises five models: Three-quarter ton, one-ton, two-ton, 3½-ton and five-ton capacities, an addition of one model—the three-quarter ton—over the line of the last two years.

Baffling Problems Solved by the Engineers.

Solution of the most vexing problems that have confronted engine truck designers since the beginning of the industry is seen in the new transmission gear-set, which is used in all models above the one ton. This transmission gear-set, accurately named the GMC two-range transmission, provides both speed in direct drive as well as pulling power in the lower gears and, at the same time, does not necessitate the use of an engine of excessive size, making the truck's operation economical.

The increase in speed is made possible by the use of a higher geared rear axle than has been used heretofore in GMC trucks, while the requirements of pulling power are furnished by giving the countershaft of the transmission an extra reduction.

The transmission countershaft is equipped with two sets of constant mesh gears of different ratios, instead of one as in the regular type four-speed motor

truck transmission. These sets are controlled by an extra lever, giving the truck two distinct power ranges, each with three speeds forward and reverse. Direct drive remaining the same regardless of the range.

Approximately 50 per cent. more speed in direct drive has been added by this two-range transmission and at the same time 30 per cent. more pulling power has been furnished through the low range of the transmission. This result is obtained by adding five major parts to those used in a regular type four-speed transmission gearset.

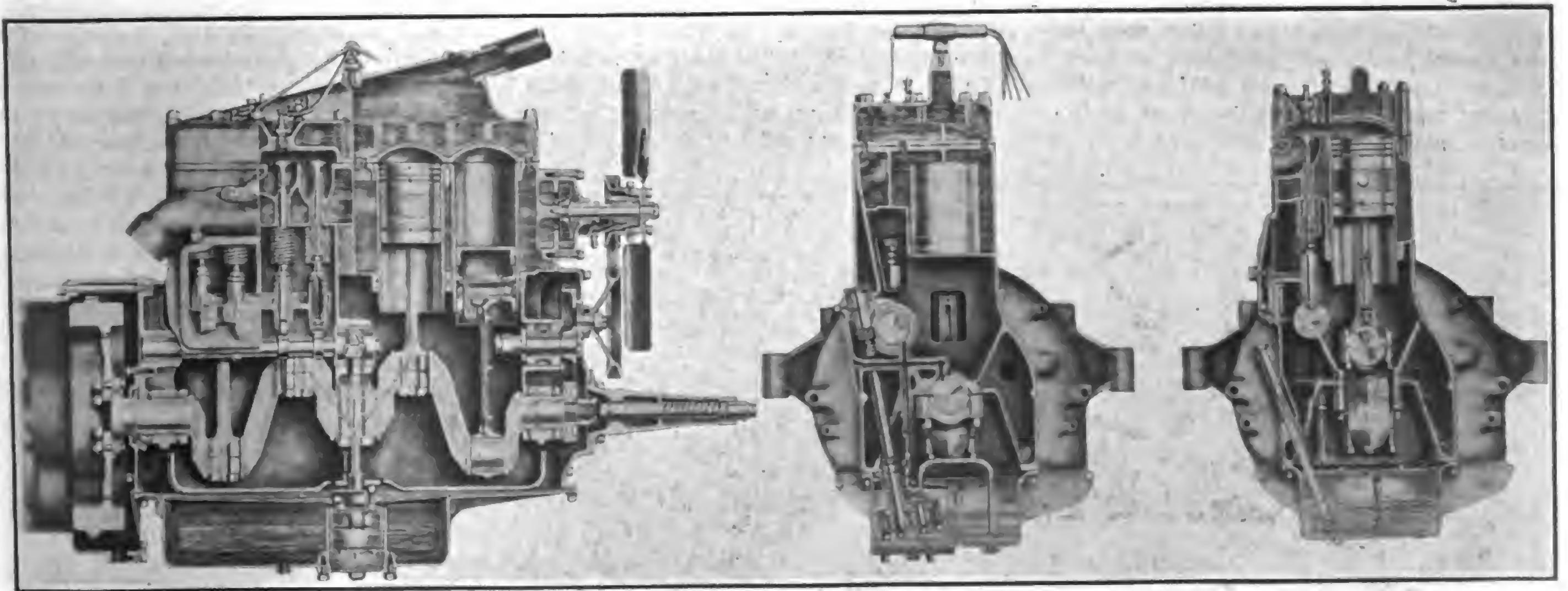
Three Fundamental Features in Engine Design.

In designing the GMC engine the engineers had three fundamental features in mind; increased efficiency; accessibility and low repair cost.

The new engine represents the accumulated experience of years of motor truck building and has been designed with regard to the finest and most improved advancements in gas engine design. The engine is of the four-cylinder, four-cycle, L head type and follows a tendency to a longer stroke and smaller bore than is seen in some four-cylinder truck engines. The engine is built in three sizes for use in the various models.

Removable cylinder walls of the "wet" type are a feature of the new engine. These are in the form of grey iron sleeves that are pressed into the cylinder block and are held rigidly in place at the top and bottom. The sleeves are machined to an accurate thickness so that the expansion is uniform, insuring not only a minimum of wear, but also increased efficiency of power from each explosion as compression is maintained at all times.

Added to this feature is that of better cooling, since the water circulates imme-



Left: Sectional View GMC Heavy Duty Engine. Center, Water Jackets of Unusual Size Prevent Overheating. Right, Massive Construction of Crankshaft, Four-Ring Piston and Pressure Lubricating System Are Special Features of the GMC Heavy Duty Engine.

diately around the cylinder walls, and also the big economy of replacement in the case of damaged cylinder walls. Replacing a sleeve is a matter of only a few hours, and can be done without removing the engine block from the chassis, thus obviating the necessity of re-boring cylinder blocks to restore compression lost through scratched or out-of-round cylinder walls.

The carburetion system has been designed to add to the engine efficiency, as the mixture is heated from the time it is being formed in the carburetor bowl until it reaches the first chamber, and is superheated just before it passes into the inlet valves. A special manifold is used for this purpose and it is adjustable for the various climatic conditions.

Every wearing part of the engine is replaceable and special attention has been given to the accessibility of these parts. One feature, that is new in heavy duty engines, is the removable valve lifter assembly. The valve lifters and rollers are held in a case, fastened in position by cap screws. Access to this assembly is through a hand plate on the side of the engine and, when the assembly is removed, direct access to the crank pins is had without removing the oil pan.

Ignition is furnished by a high-tension magneto fitted with impulse starter, which is entirely separate from the lighting system.

Cooling System Unique.

In the cooling system of the GMC engine a combination of the thermo syphon and circulating pump is employed. The pump is mounted high on the engine so that the pump driven water is thrown directly around the combustion chambers, valve pockets, etc., while the circulation around the cylinder wall jackets is by thermo syphon action. This feature approaches the ideal in cooling and allows the cylinders to receive the coldest water on the hottest sections and the warmer water where the warmth is essential.

The water jackets surrounding the engine cylinders, valve pockets and the separable head are of unusually large size, providing sufficient cooling area for the engine under all conditions of work. A large fan, mounted on a Hyatt roller bearing shaft, bolted to the front of the engine cylinder block and driven by a

V shaped leather belt from a pulley on the camshaft, insures cooling efficiency.

Pressure System Lubrication.

Lubrication of the new engine is supplied by a pressure pump located in the lower part of the engine crankcase, which forms the oil reservoir. The reservoir is located at the rear in such a manner that there is no interference with the steering of the truck. The geared oil pump is in the forward end of the reservoir, surrounded by a wire screening which prevents the entrance of sediment into the pump or oil line to the bearings. The geared pump is driven from a helical gear meshing with a worm gear on the camshaft.

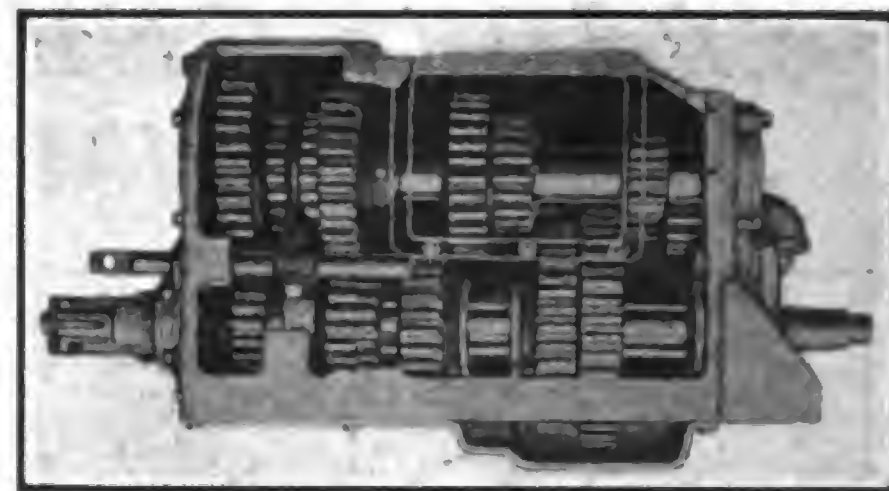
The oil is forced from the oil pump through tubing to the three main journals and to the camshaft bearings. From the main journals the oil is forced through drilled ducts in the crankshaft to the connecting rod bearings. The oil thrown off from these latter bearings thoroughly lubricate the walls of the cylinders, the pistons and valve mechanism. Lubrication is supplied to the wristpins through a tube extending the length of the connecting rod from the connecting rod bearing to the wrist pin, oil being forced through by pressure from the oil pump.

The timing gearset is lubricated by excess pressure from the oiling system, through the relief valve, the oil being conducted to the gear train through a tube and returning to the reservoir by gravity.

Description of GMC Engine.

The crankshaft is a drop forged three journaled type supported on cast webs on the interior of the crankcase. The crankcase is constructed in two sections, the upper section cast integral with the cylinder block and carries a forward extension which forms the timing gearset case and cover. The flywheel housing is cast separate from the upper crankcase and is bolted to it with long steel studs. Support arms are cast integral with the flywheel housing, one at each side of the housing, and support the engine on the chassis frame. The engine is supported at a single point at the front of the engine, forming the three-point suspension.

The pistons are fitted with three rings above the wrist pin and a single ring below the pin in the skirt of the piston. An



New GMC Two-Speed Range Transmission.

oil groove is located above the wrist pin and a second is located below the pin. Drain holes are drilled through the oil grooves into the piston skirt, allowing excess oil to drain back into the engine base, preventing carbon accumulation in the combustion chambers and on the head of the pistons.

The connected rod bearing caps are bolted to the rods with four steel alloy bolts, shims being placed between the cap and rod, separating the bearing surfaces and allowing adjustment of the bearings. The wrist pin is a steel tube fastened in the piston by means of a two diameter steel stud bolts, while the bearing in the small end of the connecting rod is a bronze bushing fitted to the wrist pin and held rigid in the connecting rod end.

The tappets are of roller type, operating in renewable guides and fitted at the upper end with a lock nut adjustment, which provides for adjustment between the valve stem end and the end of the tappet.

The engine has a wealth of projected bearing areas and has been constructed with a large margin of safety in all its parts and from the best of material obtainable.

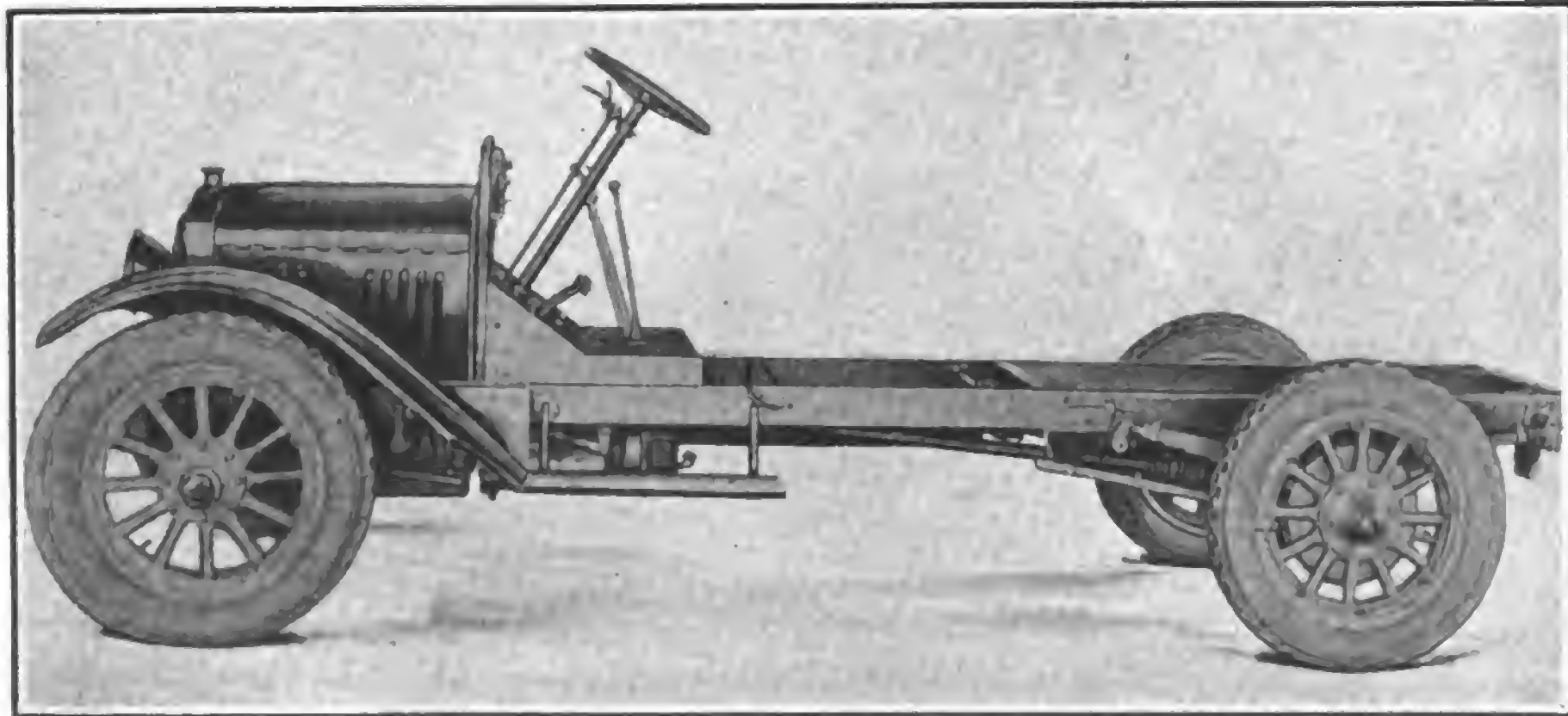
All models except the $\frac{3}{4}$ -ton are equipped with electric lights, generator and storage battery, all of special design and manufacture and built extra size for truck use. Electric wiring is carried in flexible steel tubing built as a "harness" and is centered on the dash in a neat instrument case fitted with a hinged panel to give access to all switch connections.

The $\frac{3}{4}$ and one-ton models are equipped with a new type wheel of metal felloe, wood spoke type, and the one-ton model is furnished with cord tires as standard equipment. Frames in the heavy duty models are of deep pressed steel, heat treated, and the radius rods on these models have been lengthened to make the drive more nearly a straight line. Extra brake area has been added to the $\frac{3}{4}$ and one-ton models. In other details the chassis are practically the same as those of former years.

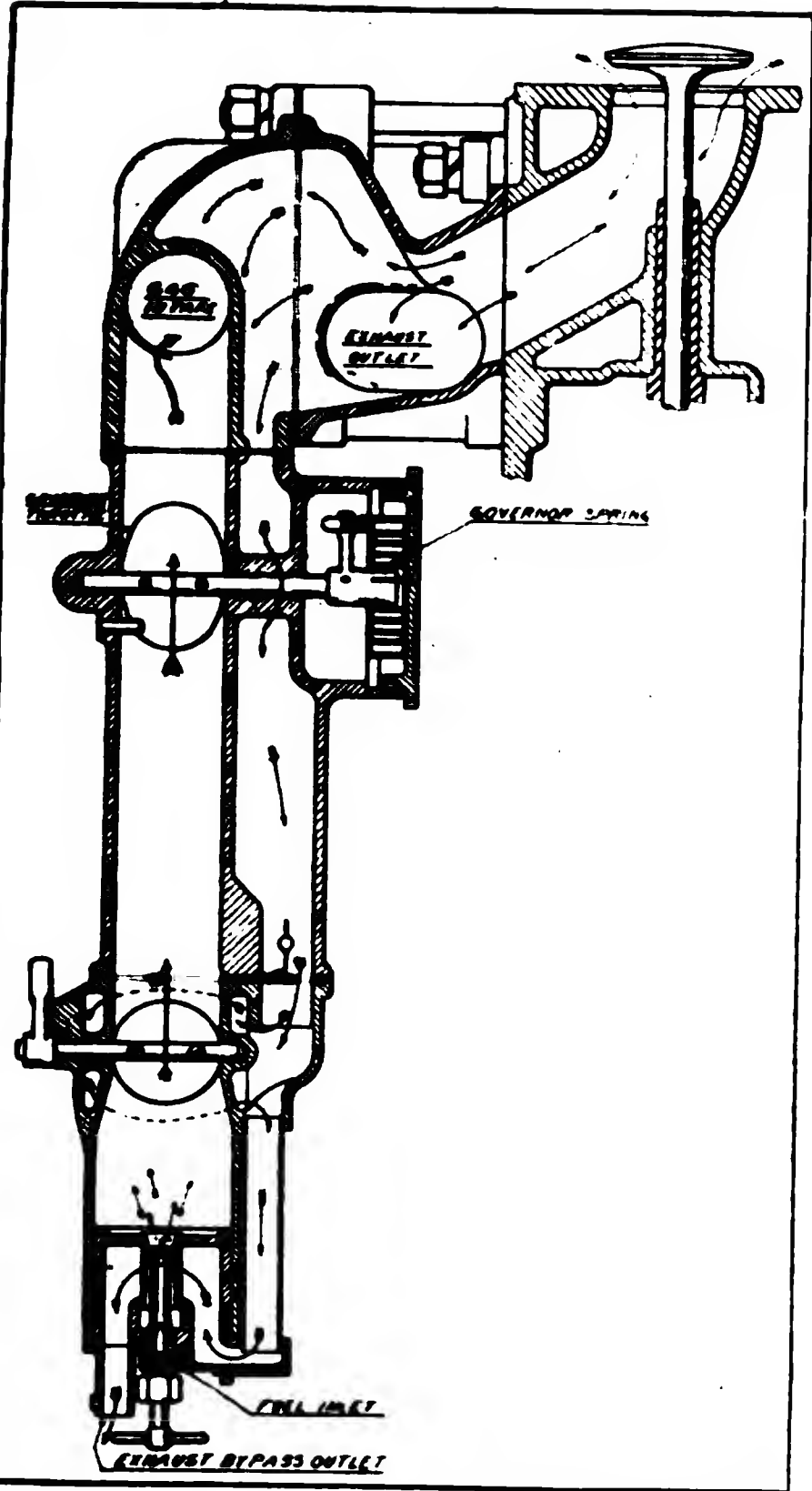
Specifications of Series "K."

The K-15, 1500-pound capacity truck is powered by a four-cylinder, L-head engine of GMC make and has a bore of $3\frac{1}{2}$ inches and stroke of $5\frac{1}{2}$ inches, developing under the S. A. E. rating 19.6 horsepower. The engine is equipped with a Marvel carburetor, high-tension magneto, manual control and combination thermo syphon and pump cooling system.

The clutch is a dry multiple disc type



K-15 Three-Quarter Ton GMC Chassis Equipped with Cord Pneumatic Tires.



Special Intake Manifold Which Heats the Incoming Gas from the Time It Leaves the Carburetor Till It Reaches the Intake Valves.

in unit with the engine and transmission, while the transmission is selective, having three speeds forward and one reverse.

The final drive is through bevel gears and differential to the semi-floating rear axles, to the wheel hubs. Pneumatic tires are furnished with this model, which are 33 by 4½ inch, front and rear. The total gear reduction on high is six to one.

The wheelbase is 132 inches and the tread standard, 56 inches.

Model K-16 One Ton Capacity.

The K-16, 2000-pound capacity truck, is powered by the same engine as the K-15 and is constructed along similar lines. The truck is constructed for a heavier class of work than the K-15 and some of the units are necessarily heavier.

The tires of this model are pneumatic cord type and the size is 34 by five inch, front and rear. The lighting and starting system is GMC make, which is standard equipment on this model.

The K-41 A and the K-41 B are similar in construction, but differ in wheelbase. The wheelbase of K-41 A being 146 inches and of K-41 B 158 inches. The capacity of either truck is 4000 pounds and each is equipped with a GMC power plant, consisting of a four-cylinder engine, L-head type, having a bore of four inches and stroke of 5½ inches, developing under S. A. E. rating 25.6 horse power.

Cooling is by finned tube radiator, conveniently placed at front of the engine, and by a combination thermo syphon and pump circulation system.

The engine is equipped with Marvel carburetor, high-tension magneto and impulse starter.

The clutch is a dry plate multiple disc type in unit with the engine and transmission, while the transmission is the new two-range type of GMC construction, having seven speeds. The final drive is through a Timken worm driven rear axle, full floating type, equipped with taper roller bearings. The total gear reduction in high is 7.25 to 1.

The tires used on both models are the same, namely, 36 by 4-inch front and 36 by 7-inch rear. The lighting and starting system is GMC make.

Models K-71 A and 71 B.

The models K-71 A and K-71 B are similar in construction and dimension of parts with the exception of the wheelbase, which in the K-71 A is 163 inches and in the K-71 B 187 inches. Both trucks have the same pay load carrying capacity of 7000 pounds and are powered by the same sized engine, which is of GMC make, having a bore of 4½ inches and stroke of six inches, developing under S. A. E. rating 32.4 horse power.

The engine is of unit construction with the cylinders, cast en bloc integral with the upper section of the engine base. The cylinder head is separable and is bolted to the top of the cylinder block with steel alloy studs.

The cooling system consists of a combination of thermo syphon and pump, operating in connection with a fan mounted at the front of the engine and a finned tube radiator placed in a conventional location at front of the engine, and mounted on the truck frame. Fuel is fed to the Marvel 1¼-inch carburetor by gravity from a tank located under the driver's seat.

The clutch is a dry plate multiple disc type, enclosed in the flywheel housing, a unit with the engine. The transmission is hung amidship and consists of a GMC special two-range, seven-speed type.

The final drive is through a full floating Timken axle to the rear wheels and all bearings of the axle are fitted with tapered roller bearings. The total gear reduction in high is 8.75 to 1.

Solid tires are used on both models, the front wheel being equipped with 36 by five-inch solid tires and the rear wheels with 40 by five-inch dual solids. The models K-71 A and K-71 B are equipped with lighting system only, of GMC make.

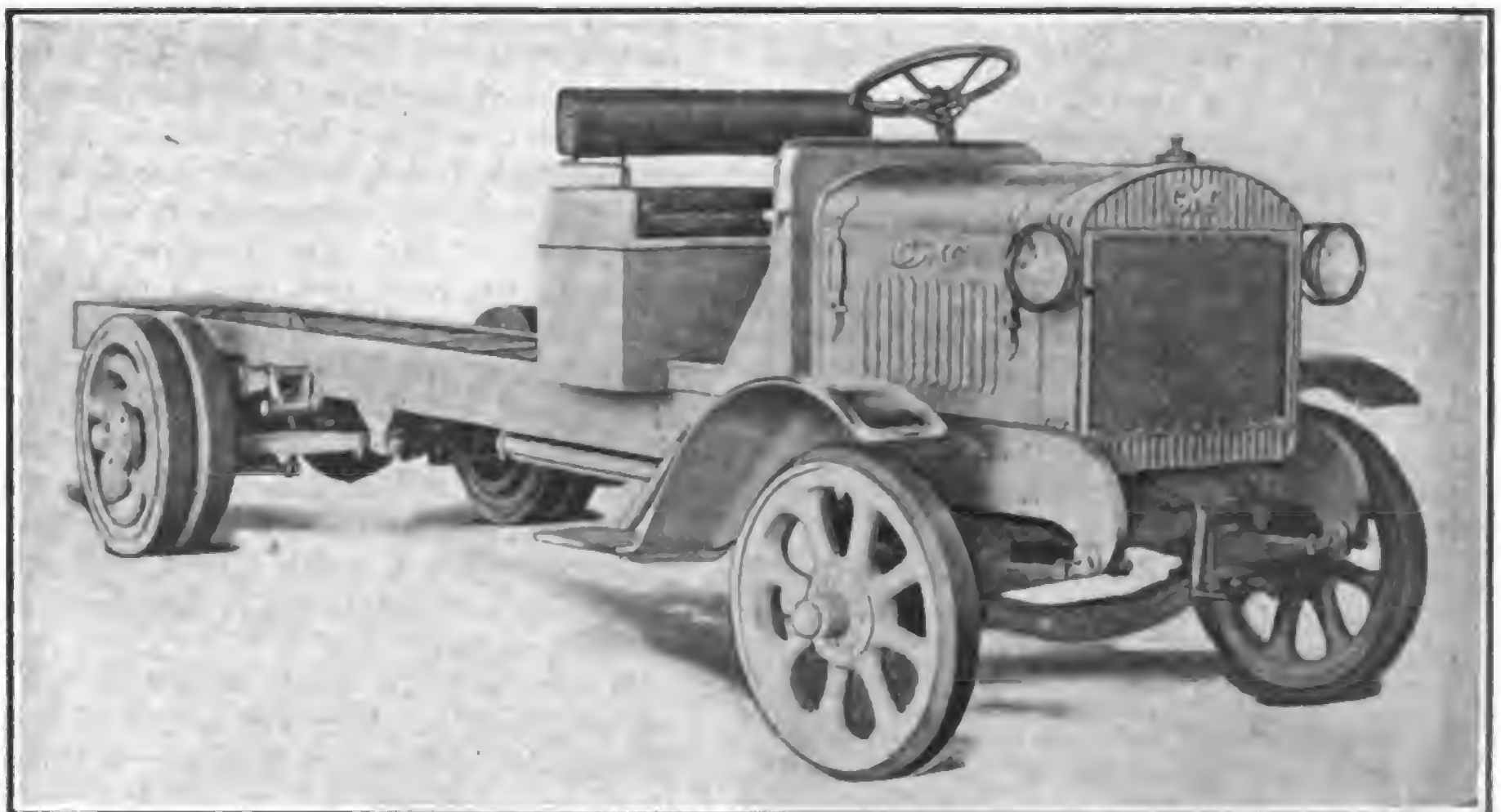
Models K-101A and K-101 B, Five-Ton Capacity.

The models K-101 A and K-101 B are similar in construction and dimension of parts with the exception that K-101 A has a wheelbase of 163 inches and K-101 B a wheelbase of 187 inches. Both trucks have the same pay load capacity of 10,000 pounds, but K-101 A, with the shorter wheelbase, is intended for commercial vehicle work where dump bodies are required, while the K-101 B is intended for longer bodies where more bulky loads are hauled. Each truck is equipped with the same dimension engine, which is a GMC special, having a bore of 4½ inches and stroke of six inches, developing under the S. A. E. rating 32.4 horse power.

The engine is of unit construction, having the cylinders cast en bloc integral with the upper section of the crankcase, and is of the L-head type, having the valves enclosed and located on the right hand side of the engine. A removable head casting makes the combustion chambers and valves accessible for cleaning carbon and grinding valves or replacing the cylinder walls.

The cooling system is the new GMC combination thermo syphon and pump system, which is used on all models of the "K" series. A finned tube radiator and fan are located in the conventional position at front of the engine, the radiator mounted on the truck frame and the fan driven from a pulley on the end of camshaft.

The clutch is a dry plate multiple disc type, mounted in the flywheel housing, and is connected to the transmission, which is hung amidship, by the conventional drive shaft fitted with flexible universal joints. The transmission is the new GMC two-range, seven-speed selective type, which has been adopted by the company for use on all of the series "K" 1921 trucks.



Model K-101 A Five-Ton GMC Chassis.

CARE AND OPERATION OF ENGINES

IT CANNOT be impressed too strongly upon the tractor or truck owner's mind that no matter how well the engine of the power plant is made that it requires a reasonable amount of care and attention and this must be contributed by the owner or operator if the engine is to function successfully.

A few minutes of concentrated abuse will perceptibly shorten the life of the finest engine made and this is best demonstrated when an operator races the engine for several minutes just after starting the engine on a cold morning, laboring under the impression that by racing the engine he is warming it up quickly and getting the engine to a point where it will develop its full power. The temperature must be raised to a sufficient point before the engine will develop its rated horsepower, but this is properly done by allowing the engine to idle for several minutes before starting work. Idling speed, if practised moderately, will not harm a heavy duty engine, but racing the engine will do untold damage to the bearings and internal

will, however, tend to lower as it is heated and will be found low even after a few minutes driving. Do not let this fact worry you as no harm will come to the engine under normal conditions.

Never fill the radiator with cold water while the engine is running nor when the engine is hot, especially if the amount of water in the radiator is low. A sudden change of temperature in the cooling system is liable to cause the cylinder castings to crack.

Always make a practise of using clean water as free from lime, rust and impurities as possible. Clean rain water, when it can be obtained, is best, as it will keep the water jackets of the engine and the core of the radiator free from lime. Water spaces coated with lime or other impurities reduce the conductivity of the water, causing the engine to overheat, increasing oil consumption and reducing the life of the engine.

Filling Gasoline Tank.

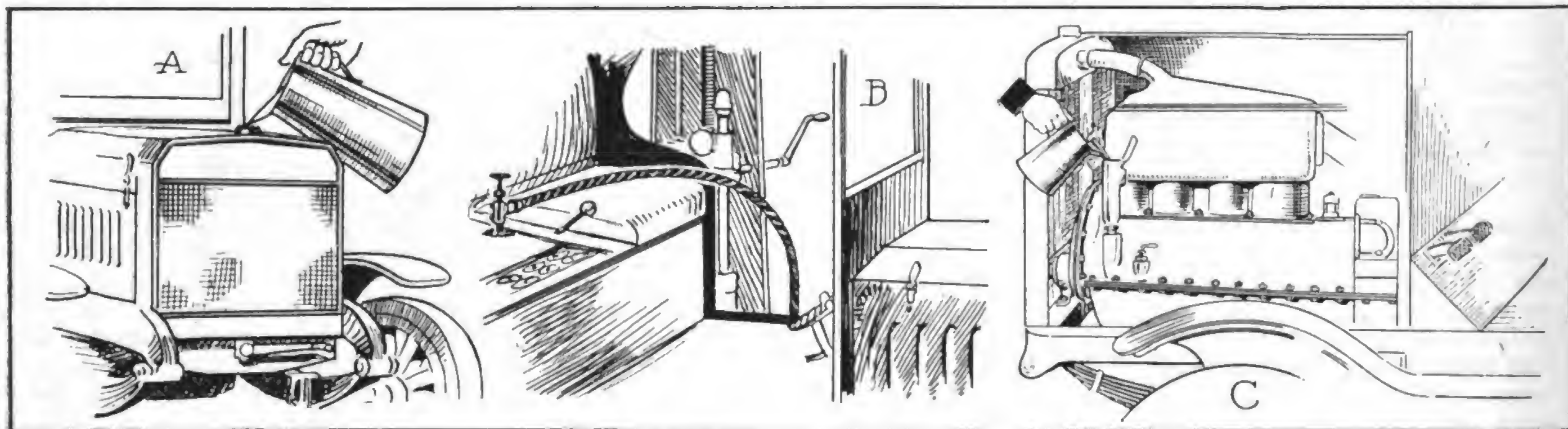
Next fill the gasoline tank. Use nothing but the best grade, as it gives the most power and does not carbonize the

There are usually three or four places that require lubrication on the modern heavy duty engine and these are usually the fan, water pump, magneto and oil reservoir in the engine pan. The pump and fan require a good grade of grease, while the magneto requires only a few drops of very fine grade oil about once in every 1000 miles of use. The oil reservoir in the engine base requires oil daily as the engine in heavy duty work uses oil more rapidly than in passenger car use. The lubricant is put into the reservoir through the breather and filler tube and in the grease cups by removing the caps.

Many engines are provided with a combined breather and oil filler tube, which acts as a ventilator for the crank case to prevent crank case pressure and increased temperature.

Never fill the engine too full of oil, as it will cause carbon to form and foul the spark plugs. A careful driver will soon learn how much oil an engine is needed for each 100-mile trip.

It is essential that the oil in the reser-



A, the Radiator Should Receive First Attention; B, Next Fill the Gasoline Tank; C, the Oil Reservoir Should Be Filled with a Good Oil.

parts, especially when it is raced without a load.

Many a trouble may be traced to some simple thing, like a carelessly made connection, dirt in the gasoline, a broken wire, a broken spark plug, etc., and drivers who understand the operation of an engine never condemn it for slips which are due to carelessness.

Preparing the Engine for Operation.

A little care used in preparing the engine for operation may save a great deal of trouble and possibly repairs at a later time.

The radiator should be the first unit to receive attention. See that all drain cocks in the water system are closed and fill the radiator with clean water. Make sure each morning before starting the truck that the radiator is full and always keep it supplied with plenty of water, to prevent the engine overheating.

In an engine with thermo-syphon cooling this point is absolutely necessary, because the water will not circulate freely unless the top tank is filled above the inlet. In pump circulation systems it is not quite as important to carry the water high in the tank as the pump will circulate water even though it be low. Water

cylinders as rapidly as low grade gasoline, which also spoils the lubricating qualities of oil.

Always strain the gasoline to remove any water or other impurities that may be present. The use of chamois skin placed over the top of a funnel is particularly good for removing water and sediment. Care should be taken, however, to see that the funnel sets on the top of the tank when filling, as many fires have resulted from leaving a small space between tank and funnel, the gasoline passing through the chamois causing frictional electricity, which causes a spark to jump between the funnel and tank.

Clean the chamois at frequent intervals to remove sediment and it will be found that gasoline will flow more freely.

Supplying Lubricant to the Engine.

After the radiator and gasoline tanks have been filled the oil reservoir should be filled with a good oil of the correct body as recommended by the engine manufacturer.

Much trouble and expense will be saved if close attention is given to the lubrication of your engine. If lubrication is neglected but once it can cause any amount of damage and expense.

voir register half way between the two lines shown on the oil level indicator, if an oil indicator is fitted to the engine, or half way on the oil gauge if gauge is used. Therefore you should replenish the supply as soon as the oil level falls below this point. The oil indicator or gauge should always show that you have oil above the half full mark. The grease cups in water pump and fan should always be kept full.

When first starting a new engine do not go above a medium speed until the bearings, pistons and cylinders are running perfectly free. Controlling or governing the speed of the engine is vastly important.

A cold engine should be warmed up slowly, as it is dangerous and detrimental to race or accelerate a cold engine. This does more harm than constant service under full load at correct engine speed. Never race a cold engine, as when this instruction is disregarded and the engine is speeded up beyond the speeds which are indicated by the manufacturer as safe running speeds, you are inviting trouble, repairs and expense, which will soon take your truck to the repair shop and may mean heavy expense.

FACTORY AND SALESROOM ON TRUCK

A complete root beer manufacturing and selling unit, mounted on a 3½-ton Selden truck, has been purchased for service with the Ringling Bros. circus. Other units will soon be working with other circuses throughout the country. Transporting the big barrels and other paraphernalia around is quite a job, so an outfit was designed to be carried on a motor truck.

The first outfit was mounted on a 3½-ton Selden, which is manufactured by the Selden Truck Corporation, Rochester, N. Y. The Richardson company holds all patents in connection with this outfit.

This truck will carry the outfit around with the circuses and is complete in every detail. Syrup and water are carried in large tanks, two self-mixers are operated by electric motor and properly mix the ingredients, the beer running into two large barrels. These barrels are really coolers and have such a capacity for cooling that the liquid would be cold even though the five spigots were to be opened continually.

The arrangements for drawing the beer, plumbing fixtures and washing pockets

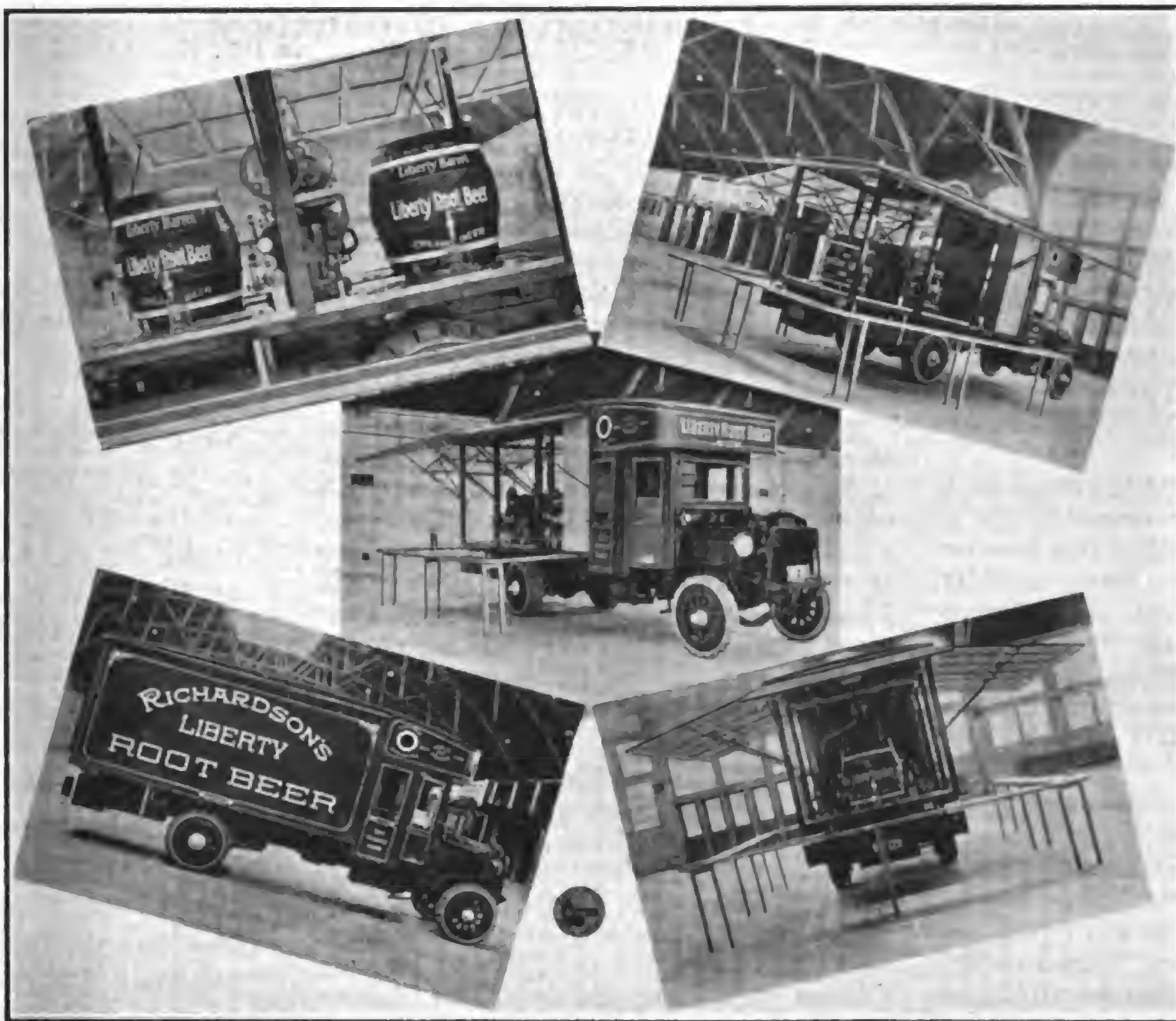
are exactly the same as at the best fountains. The outfit will make up 500 gallons of root beer with one filling. Electric lights and power are provided by auxiliary power plant, operated by gasoline. Even with the machine in full operation very little vibration is felt.

Two ticket windows are provided at the front, one on each side, as the outfit can be worked from both sides. The driver's seat folds up and provides com-

fortable padded seats for the cashiers who operate the very latest electric cash register and ticket seller. The counter reaching around the truck can be folded up and packed in long boxes carried under the truck.

The compartment over the driver's seat has a port hole and is equipped with a mattress and bed clothing. It makes a very comfortable sleeping quarter for three. The seat itself will provide a third bed room. This is one of the most compact and finest designed trucks ever completed for any kind of work and it is estimated by the Richardson company that it will pay for itself in a very short time in profits accruing from the sale of the root beer.

There are many other features to this truck. Next circus you visit look for one, for the Richardson company believes it will have similar outfits with every circus this summer. A smaller one-barrel outfit is being prepared for the small circuses. The Selden truck was chosen for a number of reasons, among which are its known reliability and certainty of securing parts wherever truck might be working.



Five Views of the Root Beer Factory and Salesroom on Selden Chassis Which Is a Money Making Medium for Ringling Bros. Circus.

S. A. E. REPORT READY ON STANDARDIZING TRUCK BODIES

A tentative subdivision report was submitted at the meeting of the truck division of the S. A. E. Standards Committee on March 15, which specified definite chassis dimensions for truck capacities from ¾ to six tons for the length back of the seat to the end of the frame, the length back of the seat to the center line of the rear axle and the frame width.

Body dimensions specified are the location of the cross sills allowing for a permissible variation of plus or minus 2½ inches of the length back of the seat to the center line of the rear axle with a one inch radial clearance between the tire and the corner of the sill and the spacing dimensions for the cross sills resting on the frame.

Dimensions for the frame height from the ground with the truck loaded the

body cross sills, the spring travel, the tire diameter, the wheelbase and the distance from top of the frame to the bottom of the body are given in the report, but are not submitted for standardization, being merely used in deriving the dimensions necessary to permit interchangeability of motor truck bodies.

The proposal is to be submitted to the motor truck and motor truck body manufacturers for criticism and comment before final consideration by the division.

TRUCKS AT INDIANAPOLIS.

A fine line of trucks attracted attention and admiration at the 22nd semi-annual show at Indianapolis, at which a million dollars worth of automotive products were on view. It was a selling show.

The Peters Auto Body and Spring Works, Baltimore, Md., has made a 15 per cent. reduction in the price of commercial automobile bodies.

TO MAKE PARTS IN DETROIT FOR 750 POLISH TRUCKS

Detroit automotive manufacturers will probably produce 75 per cent. of the parts for 1000 motor trucks to be assembled during the coming year in Poland by a newly formed company, according to advices from Warsaw.

The new Polish corporation is a combination of four leading machine manufacturers of Krakow and Warsaw. They are backed financially by a number of Poland's strongest banks and expect to begin production next summer.

The Polish war minister has already placed orders with the concern for 500 machines to be delivered during the present year.

Eight hundred truck drivers graduated at exercises conducted recently at the school of the Safety Council of the Cleveland Chamber of Commerce.

Service Next to Quality of Product In Distributor's Success

Stewart Auto Corp., Boston, Mass., Has Marketed But One Unit—The Stewart Truck—in Past Nine Years—Keeping Owners Sold Is Powerful Asset in Building A Business of Volume and Permanency.

RECOGNIZING that the owner of one truck is a definite prospect for a second and that the mission of the distributor should be to make each truck sell another, the Stewart Automobile Corporation, H. Ross Maddocks, president, New England distributor for the power product of the Stewart Motor Corporation, Buffalo, N. Y., has dedicated a substantial section of its attractive home at 595-603 Newbury street, Boston, Mass., to the giving of service.

The Stewart Automobile Corporation is the largest distributing organization in New England. It is putting the Stewart truck into service in Massachusetts, Rhode Island, Connecticut, New Hampshire, Maine, Vermont and 11 counties of New York state. Its line-up includes 87 dealers and the entire personnel of the organization totals 3000 man power.

At Boston headquarters is found a supply of parts valued at \$125,000. To care for the five different sizes of Stewart trucks as many as 20 cylinder blocks, from five to 10 motors, three or four set-up rear ends and as many transmissions are always in stock. A glance at the inventory sheet the other day disclosed the presence of 22,000 nuts and bolts.

"Stewart Service" is a standard commodity. It is one of the strongest sell-

ing points among many in the dealer's kit. It is a unit which has never broken down. It works day in and day out, year after year. Next to the quality of the product it is the cause and effect as to why President Maddocks has put in the last nine years of his business life in marketing only one product, that product a commercial car and that car the Stewart.

The efficiency of the service organization is the reason why the Stewart Automobile Corporation is able to offer truck users such a liberal policy. This provides that in addition to the usual care of the purchase for a 90-day period, the Stewart owner has his truck looked after for a period of 12 months as far as the replacement of parts goes, the only charge for the last nine months being for labor performed.

Going still further the buyer is not limited in the protection of his property to one year. If something goes wrong with his machine after that time, should the damage there be in any way traced to a defect in the product, or workmanship, free service follows. If there can be such a thing as unlimited service the Boston house of Stewart gives it.

The Stewart Policy.

Here is the policy, or warranty, which goes to every buyer and which is lived

up to down to the last detail, and, as before stated, even beyond when fair play suggests such a course.

"We desire to give each purchaser of a Stewart truck fair and business like treatment and request in all sincerity that you notify the management if you have any cause for complaint.

"For a period of one month after delivery of car we will make all necessary adjustments at our service station, 603 Newbury street, Boston, without charge, provided the car has not been injured through an accident, misuse or improper attention.

"For a period of three months after delivery of car we will replace and install at our service station, 603 Newbury street, without charge to the customer, parts which break or show excessive wear, unless said replacements are clearly necessitated by misuse or neglect.

"For a period of one year after delivery of car we will replace and install at our service station, 603 Newbury street, Boston, parts which break through defects in material, charging only for labor of installation.

"We make no warranty whatever in respect to tires, rims, windshields, ignition apparatus, lamps, gas tanks, signalling devices, generators, batteries or other trade accessories inasmuch as they are usually warranted by their respective manufacturers.

"If it is necessary to work on a customer's car outside of our service station at Boston, we reserve the right to charge for the travelling expenses of our representative."



Home of Stewart Auto Corporation, Boston, Mass., Entire Third Floor and Basement of Which Is Given Over to Servicing Stewart Trucks.

The Stewart Automobile Corporation deals in the highest form of skilled mechanical service. But it has another product, not so costly, yet requiring a certain amount of skill and finesse. This is mental service.

The distributor, his 87 dealers and their 3000 employees have as the first chapter in their book of automotive knowledge the precept that the customer

Stewart truck. When the worker feels his company is being imposed upon he may take the issue higher up at another time, but his first and last duty is to completely satisfy the customer.

A Mental Service.

President Maddocks has found this mental service—the chief attribute of which is courtesy—to be one of the or-

also a welding room where front axles may be straightened and frames welded. The force of 40 men includes a shop superintendent and a day and night foreman, as there is no intermission for the ever-flowing Stewart service.

The company does no machine work, but has its own battery charging plant and is electrically equipped to care for the electric appliances which are becom-

Forms That Add to Efficiency of Stewart Service

Phone _____

REPAIRS.

Job No. 2605 A.

Name _____ Date _____

Model _____ Car No. _____ Address _____

License _____ Mileage _____

Radiator	Promised	Send Man to
Water Pump	Spark Plugs	
Fan	Ignition	Get Car to Shop
Front Axle	Ignition Switch	See Bookkeeper
Front Wheel, R.	Ignition Resistance	Clutch
Front Wheel, L.	Ignition Unit	Windshield
Front Fender, R.	Correct Miss	Trans.
Front Fender, L.	Distributor	
Front Spring, R.	Breaker Points	Universal Joint
Front Spring, L.		Torque Arm
Track Wheels	Gas Tank	Propeller Shaft
Steering Gear	Generator	Rear
		Rear Axle
Motor	Generator Clutch	Rear Wheel, R.
	Generator Brushes	Rear Wheel, L.
	Resistance Spool and Arm.	Rear Fender, R.
Motor Bearings		Rear Fender, L.
Con. Rd. Bearings	Battery	Rear Spring, R.
Valves—Re-seat	Dry Cells	Rear Spring, L.
Carbon	Wiring	Speedometer
Push Rods	Electrical-Misc.	Gen'l Inspection
Timing Gears		Gen'l Lubrication
Oil Gauge	Carburetor	Fill Grease Cups
Horn		Top
	Running Board	Curtains
Compression	Stop Rattles-Squeaks	Body
		Lamps
Heating	Tighten Body Bolts	Tighten Bolts
Foot Brakes	Hand Brakes	Wash and Polish
Condition of Body, Fenders, Top, Etc., When Received		
REMARKS:		
Approved _____	Owner _____	
Final Inspection _____	Road Test _____	Signed by _____

AUTOMOBILE REPAIR JOB.

Job No. _____ In Work _____

License _____ Promised _____

Owner _____

Car _____ Terms _____

Instructions:

No.	OPERATION	Time
		Start
		Stop
Rate per hour	Total	\$
	Time	
	Material	\$
	Total	

Form K 14-1141

Show material used on back of card.

NO. 1000

Date _____ 19 _____

Name _____

Address _____

Requests Stewart Automobile Corporation to make the following repairs on Truck:

is always right. When he's right he's right and when he's wrong he's right. Any member of the organization who cannot learn this lesson is asked to pursue his studies elsewhere.

One's judgment and diplomatic traits may be employed in bringing the truck user down where he belongs, but nothing that borders on an argument is ever carried on by a Stewart employee with a man who is the owner or operator of a

ganization's most profitable assets. It has been the deciding factor in many repeat sales. It's one of the big answers as to why the New Englander who buys a Stewart truck is sold for life on that product.

The commodious Stewart home on Newbury street allows 29,000 square feet of working space. The entire third floor is used to store motor parts. The tool room is in the basement and there is

ing standard on the modern motor truck.

The absence of machinery is due to the company's conviction that any repair which cannot be made with wrenches, hammers and the ordinary tool is beyond effective repair. They maintain that when a part is worn or damaged beyond tool repair a new part is the remedy which will best serve the owner, from the standpoint of both efficiency and economy.

New Part Is Best Repair.

A new part means that the truck can function properly, according to the plans of the engineers who designed it. An important part partially repaired, is liable to throw the entire mechanism out of gear, or, at the very least, impair its efficiency.

The men at the factory know how to make parts and their product, not a makeshift, was the one intended for the correct operation of the truck. For instance steel parts are frequently weakened by heat treating processes not correctly supervised, and the same may be said for other operations not conducted under factory guidance.

A price list of Stewart parts shows that these may be purchased at a figure that is under their proportion to the entire truck and the experience of President Maddocks is that the purchase of a new part is far cheaper for the user than the temporary repair of a vital link in the truck mechanism. He finds that Stewart owners who have followed his advice in this respect have admitted, almost without exception, that this has proven a paying policy.

Keeping the Truck on the Road.

The Stewart company appreciates that the most practical service it can give the owner is to keep his truck on the job. That is why it is ready to doctor his case instantly many times and is keyed up to high speed in all its repair work. A rear end or motor can be installed in a half day. If a radiator or other similar part is out of kilt a service unit is slipped in quickly and the truck goes along about its business, having suffered but a momentary layup.

Three service trucks, all of 3000 pounds capacity, are on duty at headquarters and are at beck and call of Stewart owners. These all have benches on the side, with 725 bins in each. There is a power winch on every truck. There are special brackets at the rear for attaching tow poles. Every tool required in an emergency of this kind is carried and a Stewart service truck has never been known to fall down on the job.

The same efficiency which characterizes the rendering of service is also part and parcel of the firm's accounting methods. To begin with the stock room is systematically arranged. Row upon row

Forms Used to Get Stock and Credit For Parts Returned

No. 1974

MATERIAL REQUISITION.

Date _____

Stock Clerk: Please issue the following material to bearer.

Job No. _____

Name _____

Quantity	Part No.	Description	Cost	Selling Price

Form 100

Approved by _____

Mechanic _____

CREDIT REQUISITION.

Date _____

No. 1

Stock Clerk, Please Credit the Following to Job. No.

Name _____

Form 103

Cost

Selling

Qty. Ordered	Qty. Del.	Description	Cost	Selling

Mechanic _____

of numbered bins, which appear as Greek to the layman, are an A, B, C affair to the stock clerk. Corresponding numbers in a check list locate each instantly.

A perpetual inventory is kept, so that the company knows exactly how many motors, rear ends, nuts or bolts, it has on hand at any hour of the day or night. This process naturally saves needless and expensive ordering and also ensures a supply of all units at all times.

By coordination between the stock room, the tool room and the office the bookkeeping is carried on along the same effective lines. The patron can be told what his bill is in the middle of the job

or in the middle of any day that the work is being done. This bill can be made out in a matter of minutes.

This system pays for itself many times over through its utility as a bringer in of ready cash. Instead of sending a statement the first of the following month, which may be two or three weeks away, the bill is ready when the work is done and goes out with the truck. The response is immediate in most instances.

The use of forms is a necessary adjunct to this high powered establishment. The following form is complete for a repair job, allowing full details to be given as to the exact nature of the work. It routes the job through the entire process from the time the owner's order is taken into the office until the truck is back on the road and the story of the completed job reaches the bookkeeper again. All important forms are, of course, in duplicate.

Effective Shop Forms.

The repair shop order No. 1000 is the request made for repairs on any truck of a minor nature, and which has less detail than the other blank. It is used for instance when there is a call to have brakes tightened, or for oiling or greasing, etc. It is signed by the driver or owner of the truck so that at the time the work is completed there will be no dispute as to the work done.

The automobile repair card, which is of pasteboard, is used for checking time



The Salesroom of the Stewart Auto Corporation, Boston, Mass., Where One May Buy the Truck with Which Practically Unlimited Service Is Given.



View of Service Room of Stewart Auto Corporation, Boston, Mass., Showing Layout of Bins, and Accountants Who Keep Perpetual Inventory and Check Up the Various Forms Used.

on the job. To explain, first an order number is given to each job coming in, the time promised is put on and the owner's name. Then the man punches the clock at the time he starts the work and at the time he stops. These cards with requisitions for material go up stairs each morning, and an invoice is made up to date, so that a balance can be struck off at any time.

If, for instance, a man should go to the stock room with a material requisition, and on it he might get six piston rings, and then might use only four of them, so that two would be returned at the time he returned the same, he would get a credit requisition, which is filed in the envelope with the particular job going through, so that this is credited at the time same is taken back.

All of these clerical kinks are first aids in rounding out the result getting efforts of the Stewart Automobile Corporation to back up the quality product it merchandises, and demonstrate the interest of the house in those with whom it deals, all of which has built a business of ascending volume, with practical, satisfying service as its corner stone.

EGAN TO SOUTHERN MOTORS.

Frank H. Egan has been placed in charge of the manufacturing department of Southern Motors Manufacturing Association, Ltd., Houston, Tex. Mr. Egan was for eight years production manager of the Nordyke & Marmon Co., Indianapolis; for two years superintendent of manufacturing for Pierce-Arrow at Buffalo and for two years superintendent of the Hudson Motor Car Co., Detroit. Through the acquisition of Mr. Egan Southern Motors has rounded out its organization and the manufacturing and production departments are particularly strong through the direction of Mr. Egan with his wide experience gained with so many of the leading manufacturers of high quality cars.

There were a dozen displays of trucks at the Atlanta, Ga., show, which proved highly productive to the industry over a widely scattered section of the South.

WALTHAM 1½-TON TRUCK IS BUILT TO STAND UP UNDER HARD WORK

The new Waltham Model "E," 1½-ton capacity truck, which made its debut at the Chicago show, is an assembled product showing careful selection of standard units, which have been proven by several years of use to be free from weakness and to be able to stand up under the hardest usage in commercial vehicle work.

The truck is powered by a Buda Model CTU L-head, four-cylinder, four-cycle engine having a bore and stroke of 3¼x5¼ inches and developing under S. A. E. rating 22.5 horsepower, which is considered amply sufficient power for all purposes and is claimed in actual practise to be very economical in the use of fuel and oil.

The frame of the truck is of pressed steel, five inches deep, 2¼ inches wide and ¼ inch thick.

The engine is equipped with one-inch Zenith carburetor, while the ignition is supplied by an Apollo magneto fitted

with adjustable spark control.

Electric starting and lighting units are fitted to the engine at no extra cost, the Bijur system being used in connection with a Prest-O-Lite storage battery.

The clutch is a Fuller dry disc type, enclosed in the flywheel housing, while the transmission gearset, fitted with three forward and one reverse selective speeds, is in unit with the engine and clutch.

The final drive is through a Sheldon worm and worm wheel to the axles and wheel hubs to the wheels. The total gear reduction on high is 7.8 to one. The wheelbase of the truck is 140 inches and the tread standard 56 inches.

The cooling system of the engine consists of a centrifugal water pump operated by the engine, a C. I. Schell tubular radiator and a four-bladed fan, also driven by the engine, which is located in the rear of the radiator.

The price of the Waltham 3000-pound Model "E" truck chassis fully equipped is \$2500 f. o. b. Chicago, Ill.

BOSTON SELDEN CONFERENCES.

Three days conference of the Selden truck forces was held during the Boston show, when Vice President Hal T. Boulden of Selden Motor Truck Co. made an address to over 100 dealers comprising the New England organization. He reviewed the history of motor transportation from its early days and showed how the commercial vehicle proved its value in all lines of business so thoroughly that now no one disputed its necessity to keep business alive.

He paid a high tribute to Mr. Baker, who has done so much to make the Selden a factor in New England industrial life. A number of the dealers have arranged to make a trip to the factory in a body in the near future for another conference that Mr. Boulden is arranging, when men from other sections of the country will be present and everyone can exchange merchandising ideas.

During the conference addresses were given by J. R. Coleman, chief engineer; G. H. Covert, special representative, and J. E. Pickens, transportation engineer.



The New Waltham 1½-Ton Truck, Which Is Made Up of Carefully Selected Standard Units.

CALL FOR "UNDER THE BODY" HOISTS

THE Heil Co., Milwaukee, Wis., makers of quality tanks, bodies and hoists, calls attention to the general tendency toward "under the body" hoists as demonstrated at recent automobile shows.

"There has been a decided preference shown for the Hydro hoist and Heil bodies all through the Middle West," the company says.

"This decided preference is due," continues the statement, "to the fact not only that contractors are requiring short wheelbase trucks, but that dealers and manufacturers especially are recognizing that contractors will demand short wheelbase trucks, and so are securing Heil equipment on all trucks intended for road work."

At the Milwaukee Auto Show the following trucks were equipped with Heil bodies and hoists:

Two Macks, 3½ ton and 7½ ton, with four in one combination body.

Two Sterlings; one five ton four in one combination body, and one 7½ ton standard gravel body.

One Sandow, 3½ ton, four in one combination body.

One Kissel, 3½ ton, with a special lumber and coal body.

One Federal, five ton, combination body.

One Master, five ton, combination body.

One Clydesdale, five ton, combination body.

One Parker, 3½ ton, combination body.

Besides these the Titan Truck Co. showed two Heil bodies and Heil bodies were shown on Pierce and Kissel trucks.

At the good roads show in Chicago Heil bodies and hoists were mounted on the following:

One Sterling 7½ ton, standard dump body.

One five ton Hendrickson, special steel body.

One 2½ ton Indiana, combination body for gravel.

One two ton GMC, gravel body.

One Nash, two ton rear drive, gravel body.

Besides these Heil bodies were shown on Winther, Kissel, Federal and two Titan trucks.

All together at the good roads show there were 15 end dump bodies, 10 of which were manufactured by the Heil company. The Heil company had five hydro hoists on display and there were seven others.

Most of the dumping units displayed at the St. Paul show were Heil. The 2½-ton Sterling truck, painted bright red, which attracted so much attention, was equipped with a two yard Heil body, full length mud guards and the Heil hydro hoist. Then on the two ton Nash special dump job one could not help noticing the neat, compact dumping unit. It was also Heil.

There was a two-ton Acme with the Heil four-in-one combination body mounted on it. Also two Titan trucks with standard Heil bodies were exhibited. The Pence Automobile Co. exhibited a GMC truck with a compartment gasoline tank mounted on it. This tank was one of the several hundred brought by the Sinclair Refining Co. and Heil built them.

One of the sensations of the truck show was the massive five-ton Master trucks equipped with a special six-yard Heil body for soft coal and a Heil hydro hoist. The hoist on this job was hooked up with an electric motor and was operated during the show. Crowds were constantly surrounding this exhibit, while the powerful little Heil hoist lifted that great body with the ease and sureness with which a man raises his arm.

The fact that the Heil company builds both bodies and hoists in the same plant enables them to coordinate two parts to work together most satisfactorily.

In all the motor truck shows this year the company has been exhibiting a miniature truck on which is mounted a Heil combination body and hydro hoist.

The idea of building this truck was conceived by the engineers of the Hydro

Hoist Co., who carried it through to completion without the knowledge of the vice president of the concern J. P. Heil. All of the steel castings required were donated by the various companies from whom the usual castings are purchased.

On Christmas day a delegation of the employees presented the truck to Mr. Heil as a present.

The advertising department aided the movement with a view to using it in the various truck shows over the country. The first exhibition was made in the window of the First Wisconsin Trust Co., Milwaukee. The hoist was operated for about a week, attracting crowds and receiving a great deal of publicity. It was taken directly from there to the Milwaukee Auto show and then to the Chicago Good Roads show and later to various state highway schools.

The truck has an overall length of six feet three inches, 31 inches wide and about two feet high. It is exact in every detail and is just one-third actual size. It is painted bright red and always attracted a great deal of attention from both children and adults.

The hoist, though very small, has a great deal of power and at the various shows it was used to lift passengers—on one occasion 220 pounds.

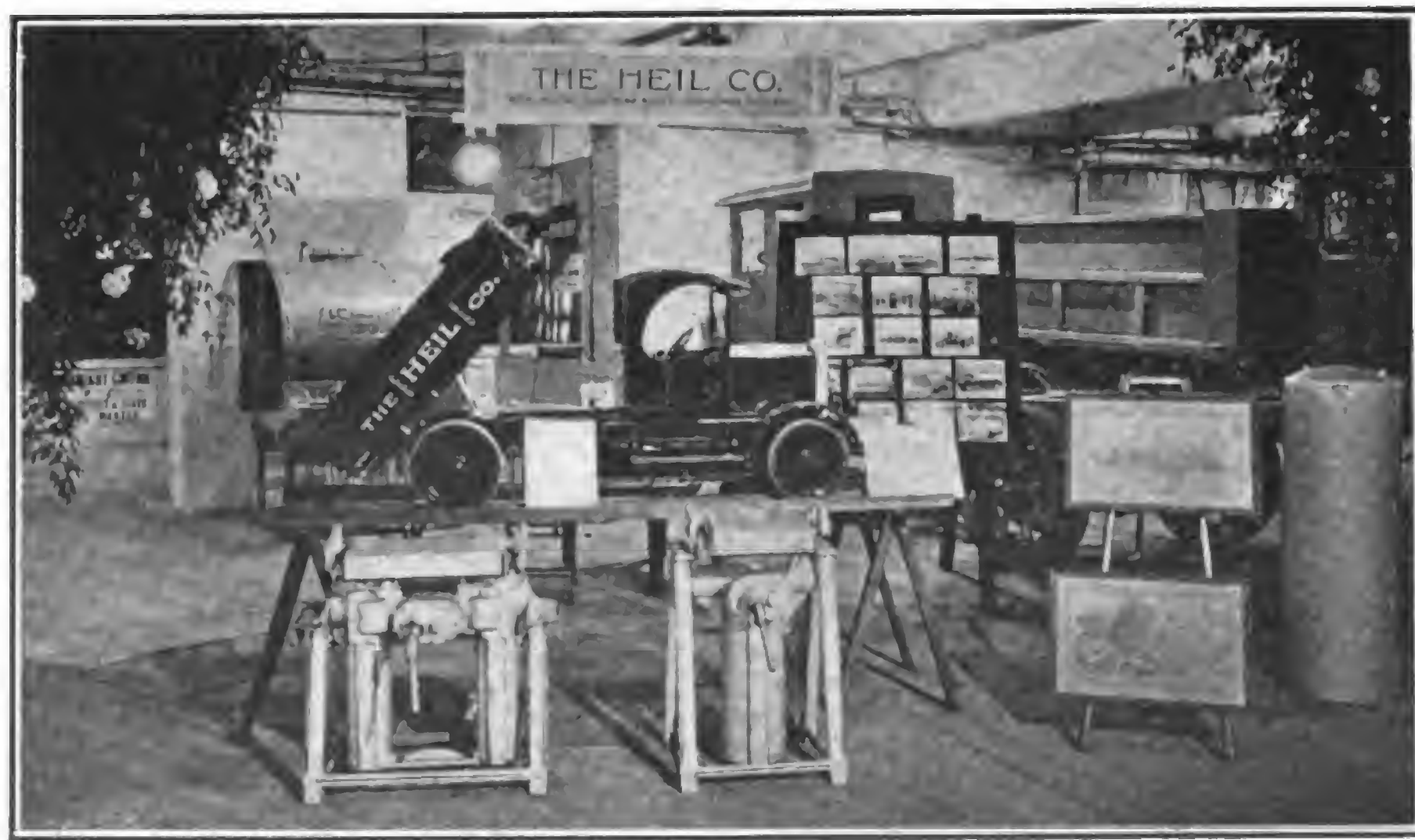
CONSOLIDATED RURAL SCHOOLS A TRUCK MARKET.

Twelve thousand consolidated rural schools in the United States are using vehicles for transporting pupils. About half the equipment is motorized and the remainder horse drawn. The National Automobile Chamber of Commerce has sent a bulletin to its members pointing out the sales possibilities in this field. It is pointed out also that 194,000 one-room schools not yet consolidated, promise a future motor vehicle market. Pennsylvania now has under consideration 275 new consolidations.

The use of motor vehicles for consolidated schools has been urged by P. P. Claxton, United States commissioner of education. The bulletin explains that J. C. Muerman of the United States Bureau of Education has provided the following suggestions on body styles:

1. Top ventilators are desirable.
2. Preferable to have driver's seat in the same compartment as passengers, so that he can keep control of children.
3. As much weight as possible needed on front wheels. Present tendency is for large school buses to have too much weight on rear wheels.
4. Two exits important, in case of fire, capsizing or stalling in drifts.
5. Where four rows of seats, running lengthwise of bus, are provided, ample aisle space should be allowed, using maximum possible width of body.
6. Upholstery—If not too expensive, removable khaki upholstery over leather or leatherette would be preferable to plain leather currently used, as the khaki could be removed and washed.

The Detroit Trailer Co., which recently acquired the Mansfield Steel Co., has appointed G. W. Machtrelb as general sales manager. He is a former Goodrich man.



Miniature Truck, Equipped with Heil Combination Body and Hydro Hoist, Which Won Attention at the Auto Shows.

TRUCK IN INDIA FILLS PLACE OF 20 CARTS AND 100 MEN

The accompanying illustration shows one of the six Wichita 3½-ton trucks manufactured by the Wichita Motors Co., Wichita Falls, Tex., hauling brick for Mackintosh Burn, Ltd., builders and contractors of Calcutta, India. To the left are the carts drawn by Indian buffalo which these trucks have since replaced, while above the truck are seen the natives with their baskets, which previously had been replaced by the ox carts. This illustration is extremely interesting because it shows three eras of transportation in India.

Mackintosh Burn, Ltd., have been in the building and contracting business at Calcutta for 15 years, and first relied upon man power to carry their building material. Each man would carry 100 pounds of brick upon his head in the baskets shown laying at their feet in the picture, and when these men were replaced by the ox carts it was considered that great progress had been made toward more efficient and economical transportation. For a long time the oxen held sway, for it only took one driver and four men to load and unload the carts, which did the same work that previously required 15 or 20 men.

It was when this builder and contractor placed the first Wichita trucks in service that he realized a still greater advance had been made in his transportation facilities and greater economy and efficiency had been affected. Because of the extremely slow speed of the buffalo team and the time required for unloading, it was found one Wichita dump truck could do the work of 20 carts. Because of the dumping feature of the truck body no labor was required to unload the brick and the only time the brick were handled was in the loading.

Each of the six Wichita 3½-ton trucks which Mackintosh Burn, Ltd., operate, replaced 20 buffalo carts and 100 men, each of which in its day of supremacy had taken the jobs of 15 or 20 men. Today each truck is accomplishing the same results that were accomplished years ago by 300 men.

A common laborer in India is paid one rupee per day, which would amount to about 40 cents of our money. A daily pay roll of \$120 would be required to maintain a crew necessary to do the work of one truck, even at the extreme low wage of 40 cents per man. The daily operating cost of each 3½-ton truck is approximately 37½ rupees (\$15), and the large saving which the trucks affect accounts for Wichita trucks being used in 83 foreign countries.

GOODYEAR BOOSTS WILSON.

The Goodyear Tire & Rubber Co. has named Robert S. Wilson, manager of the truck tire department, as manager of the western division, which includes 10 states. Wilson, who is a Princeton man, will have his headquarters at Chicago.

From Duplex Truck Co. Book- let "Vocational Selling as Applied to the Motor Truck Industry."

"Advertising is perhaps the most important branch of merchandising, and yet the one most misunderstood and neglected. Advertising is the one phase of selling which is difficult to trace through to its direct value, and yet we know that we must advertise in order to build our business.

"Advertising is like the barrage fire of our army. It opens the way for the troops to follow through to their objective. So if there be no troops to follow through the ammunition is wasted. The best advertising in the world would not be worth a cent unless there were an organization back of it.

"Advertising merely tells in print your sales story as your salesmen tell it in person.

"Tell your story in advertising. Organize your sales force to follow up that advertising and preach the same facts and principles. If these two things are conscientiously carried out you need have no fear of your profits at end of year."

G. M. EXPORT CO. ELECTS.

At a meeting of the directors of the General Motors Export Co. on March 15 Paul Fitzpatrick, who recently resigned as a vice president of the General Motors Acceptance Corporation, was elected a director and vice president. The board now consists of J. Amory Haskell, Curtis C. Cooper, Alfred P. Sloan, Jr., Peter S. Steenstrup and Alfred H. Swayne, in addition to Mr. Fitzpatrick.

The officers are: Mr. Haskell, president; Mr. Steenstrup, vice president and general manager of sales and service; Mr. Fitzpatrick, vice president, general manager of operations; Mr. Swayne, vice president, directing financial policies; Mr. Cooper, vice president; Mr. Sloan, vice president; Austin S. Murray, treasurer; Thomas S. Merrill, secretary, and George S. Bartholomew, assistant secretary.

ART WORKS TO TEACH TRANSPORTATION IN THE WEST

A further drive on the people of the West to show the utilitarian value of motor transportation has been begun by the National Automobile Dealers' association. The association has sent into the western states Ezra W. Clark of the Clark Equipment Co. with the now famed series of paintings which formed a distinguished feature of the national automobile shows and which depict the "Spirit of Transportation."

Mr. Clark will visit the following cities on the date named: Portland, Ore., April 15; Sacramento, Cal., April 21; San Francisco, Cal., April 27; Los Angeles, Cal., May 4; San Diego, Cal., May 11; Salt Lake City, Utah, May 18; Denver, Col., May 25; Omaha, Neb., June 1.

The tour is designed to accomplish four things. First, to give the dealer a view of the broad and important service he is rendering to the community, linking his activities with the industrial activities of his city. Second, to crystallize in the community the sentiment of the substantial business men that industrial activity is increasing and that business is getting better. Third, that there are abundant resources for the financing of legitimate business and that the automobile business is not only a legitimate business, but an absolute necessity, and that it must be provided with ample credits to care for its growing needs. Fourth, to establish in the public mind a knowledge of the importance of the automotive industry as a creator of a new system of transportation as vitally important to the nation as the railroads.

Mr. Clark will demonstrate that the public welfare demands that this industry be treated fairly and justly in matters of taxation and legislation, that hard surfaced roads are as necessary to the progress of a community as steel rails, and that automobiles and trucks are not competitors of railroad lines, but feeders of rail transportation.

Up to Feb. 28 there were 43,688 trucks registered in Pennsylvania, against 32,614 at the same time last year.



One of Six Wichita 3½-Ton Trucks Used to Haul Bricks in India, Each Unit Replacing 20 Ox Carts and 100 Men.

U. S. LISTS 9,211,295 MOTOR VEHICLES

According to figures compiled by the Bureau of Public Roads of the United States Department of Agriculture in a study of revenue available for road building purposes, a total of 9,211,295 motor cars, including commercial vehicles, were registered last year in the 48 states and District of Columbia.

There were also registered a total of 236,146 motorcycles. The registration and license fees, including those for chauffeurs, operators and dealers, amounted to \$102,034,106.26. As compared with 1919 the data for 1920 represents an increase of 22 per cent., or 1,645,849 motor cars. This increase alone lacks but four per cent. of being equal to the total registrations of the United States six years ago.

In 1920 in the State of New York alone the number of motor cars registered, including commercial vehicles, exceeded the total cars registered in the whole of the United States in 1910. Furthermore, the revenues derived from registration in the State of New York in 1920 were about equal to the entire registration revenues of the United States for 1913.

The use made of the revenues has changed with the passing of years. In 1906 the total registrations were approximately 48,000 cars, paying a gross revenue of about \$193,000 (Arizona in

1920 paid approximately this amount). In 1906 the gross registration revenues were equal to less than three-tenths of one per cent. of the total rural road and bridge expenditures for that year.

The registration revenues in 1920 were equal to about 25 per cent. of the total rural road and bridge expenditures for the calendar year 1919. In 1906 practically none of the motor vehicle revenues was applied to road maintenance or construction, while in 1920, 96 per cent., or a total of \$97,997,160.60, was used for this purpose. The remaining four per cent. not applied to road work was expended very largely for number plates and in carrying out the provisions of the motor vehicle registration laws in the several states. Of the total amount applied to road work, 79 per cent., or \$77,531,582.57, was expended under the control or supervision of the several state highway departments.

Increasing Amount Spent for Road Work.

For a number of years the general tendency toward devoting an ever increasing portion of the motor vehicle revenues to road work under the control and direct supervision of the state highway department has been very noticeable. Prior to 1912 only a very small portion of the motor vehicle registration was devoted to this purpose. In 1920 76 per

cent. of the revenue, or \$77,531,582.57, was applied to road work under the direct supervision of the state highway departments and in addition \$20,465,578.04 was applied to road work by counties or other local supervision, but with little or no direct supervision from the state highway departments.

In most states the motor vehicle revenues are devoted to maintenance and repair of the state roads or other improved highways. These states seem to have solved fairly well the difficult problem of securing funds for the maintenance of the more important roads under the ever increasing traffic requirements. As both the traffic and the revenues increase with the number of cars, there apparently exists a possibility of so adjusting registration rates as to keep pace with ever growing maintenance changes.

A number of the states having in general but a small mileage of improved roads have recently adopted the plan of capitalizing the motor vehicle revenues and devoting these funds to road construction. The states doing this are Illinois, Maine, Minnesota, Missouri, Nevada, Utah and Wyoming. In them bonds have been voted or issued for road construction and the principal, in some instances also the interest, is to be paid entirely from the motor vehicle revenue.

SCHURMEIER-WHITNEY TRUCK BODIES

The Schurmeier-Whitney Co. of Minneapolis and St. Paul, Minn., announces that it is now in new quarters and is prepared to build a large and varied line of commercial vehicle bodies, which includes special bodies for the Ford ton truck, Reo, Olds and many other light trucks, as well as heavier types of bodies for larger sizes of motor trucks.

The new building is situated in the heart of the wholesale district, the property being acquired some years ago, and the main building, which is a four-story, reinforced concrete structure was erected last summer. Adjoining the main building

are dry kiln, lumber and storage sheds.

A private spur track connects the plant with the main line, which is served by the Great Northern and Burlington railways, giving the new plant unusual shipping facilities.

The design and equipment throughout the plant follow the most modern scientific ideas, and the lower floor contains the iron working plant with forges, punches, shears, drill presses, etc. The track level floor is the wood working machine shop.

Many of the machines are said to be of considerable interest, such as the hollow

chisel and chain mortisers, which bore square and oblong holes; dados for making wide cuts; multiple spindle borers for drilling from four to 16 holes at a time, etc.

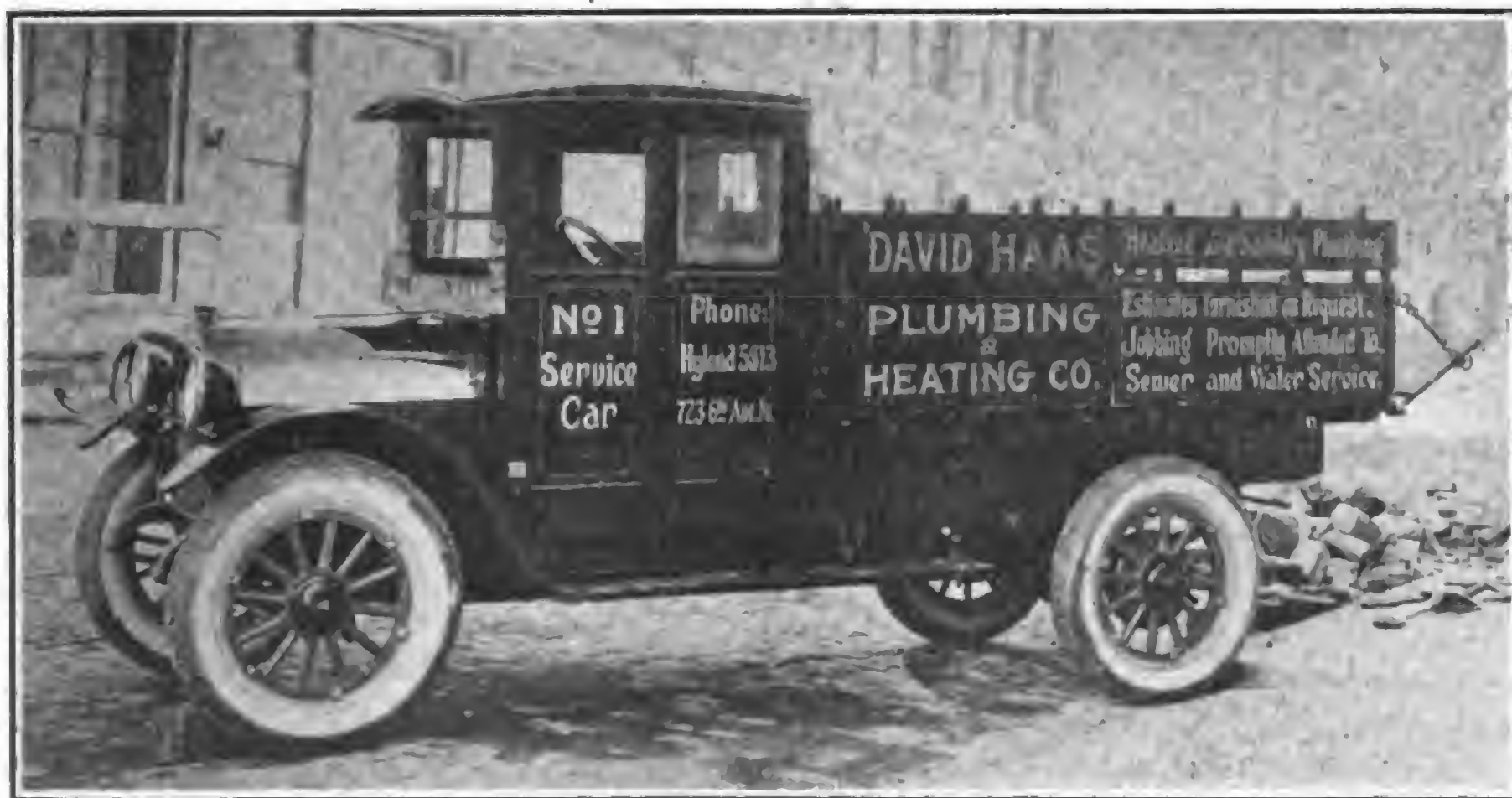
The plant is fully equipped to turn out all types of commercial vehicle bodies from one-half ton to five-ton sizes.

HOME FOR DENBY AGENCY.

The Denby Motor Truck Co. of the Northwest has opened a new distributing headquarters in a handsome new building at 10th and Davis streets, Portland, Ore. R. J. Monroe, long an efficient Denby man, is in charge. Glenn Harmon and W. H. Ogden, well known in the trade, are Mr. Monroe's field representatives. A complete stock of service parts is carried and service will be stressed in every detail. This distributing house is to supply Denby dealers and users in Oregon, Washington and Idaho.

TRUCK AND STEAMSHIP LINES TO WORK TOGETHER.

A movement is on foot to establish motor truck and steamship service on points such as Bridgeport, New Haven, New London, Providence, Fall River, New Bedford, Boston, Beverly, Portsmouth, Portland, Bangor, etc. The establishment of such service in coordination with the truck lines from the important industrial centers should prove highly profitable.

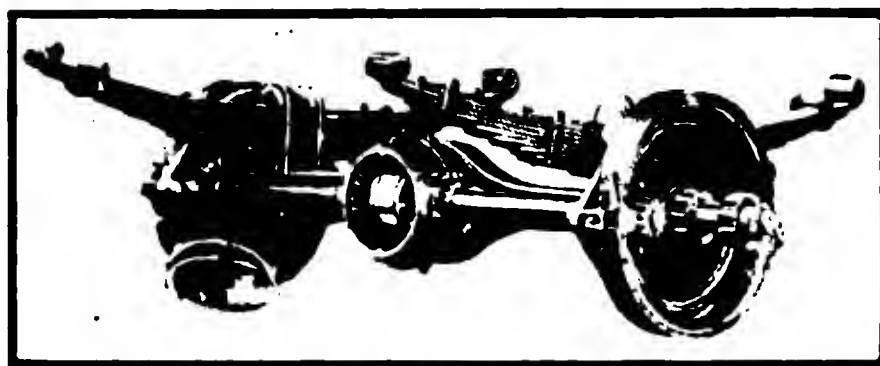


The Schurmeier-Whitney Co. Stake Body and Cab Equipment, Which Has Proven Highly Practical in Actual Work.

THE CASE TWO-TON FARM TRUCK

THE new Case two-ton farm motor truck is designed especially for the farmer and his needs. The engineers of the J. I. Case Plow Works Co., Racine, Wis., have incorporated in their farm truck many new and novel structural features which offer a special appeal to farmers in general throughout the country. Their many years of experience in manufacturing tractors and other farming machinery has told them what the farmer wants and the development of the new truck necessarily follows along these lines, the unit being primarily designed and constructed for the farmer's use.

Before beginning work on this truck an exhaustive investigation was made of the truck problem on the farm and the engineers finally decided that a truck having a pay load capacity of two tons, with liberal reserve, fitted with giant pneumatic cord tires instead of solids, equipped with an all-weather cab and



Torbensen Internal Gear Drive Axle of the New Case Farm Truck.

drove a 32-inch separator, fully equipped, threshing wet oats. Practically no vibration was shown, and it was found that the hand brakes of the truck were sufficient to hold the truck in position without blocking the wheels.

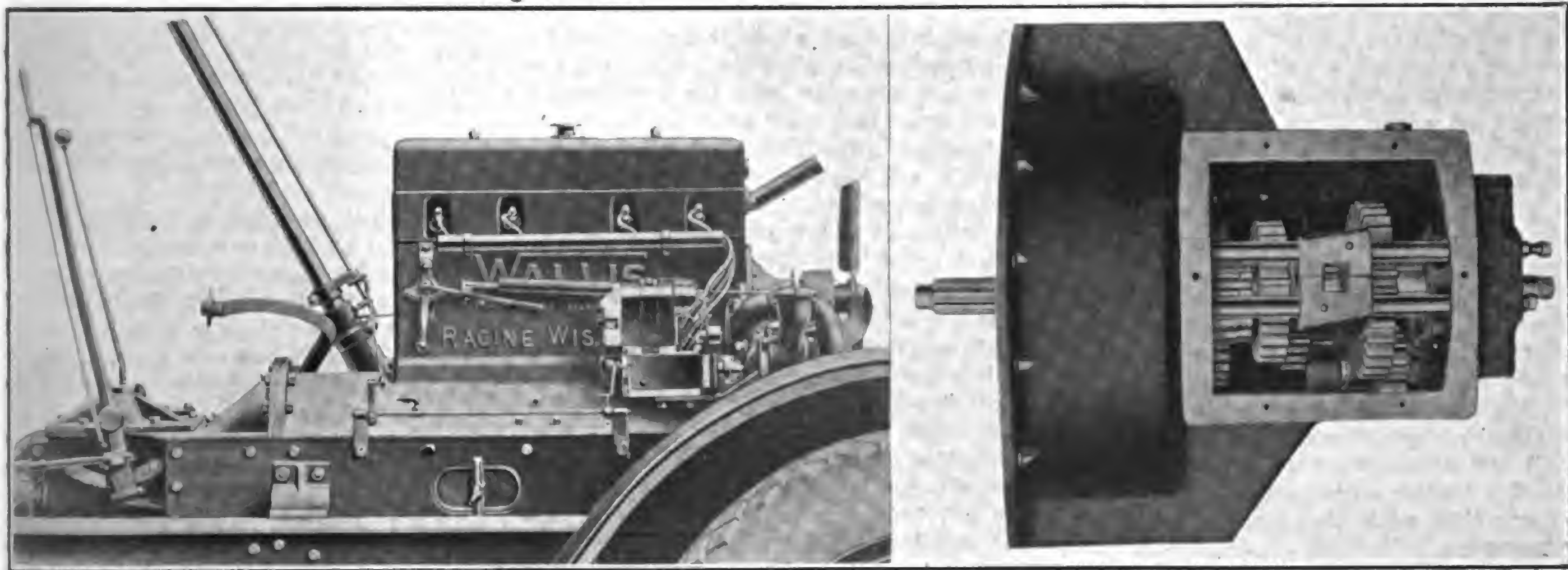
Many uses of this belt power can be found on the farm, such as threshing, corn husking, silo filling, sawing wood, grinding feed, hay baling, etc. If a tractor is used for this purpose it can be released for field work.

It was the finding of the company after extended study among farmers in gen-

erations per minute and develops under S. A. E. rating 29 horsepower, figured at 1000 feet of piston travel per. minute. The long stroke gives the greatest possible crankshaft leverage and allows full power from the expansion of gases.

The cylinder head is removable, with inlet and exhaust valves seated directly into the head. This construction allows the combustion chamber to be entirely machined which is assurance of the highest possible fuel economy. The valve mechanism is fully enclosed and is lubricated by oil mist from the crankcase.

The pistons are of a special grade of close grained grey iron, and are ground accurately to a fit. Each piston is equipped with three rings above the wrist pin, and oil grooves below the pin to insure proper distribution of oil. Each piston and connecting rod is accurately weighed and balanced so that all four are of the same weight, insuring perfect balance. The wrist pins are of steel



Left: Wallis Tractor Engine Used in New Case Two-Ton Farm Truck. Right: The Clutch and Transmission Are Housed in An Unusually Large Semi-Steel Case, Which Is Bolted to the Flywheel Housing.

general utility body, and with provisions made so that the power of the engine can be utilized for belt work when the truck is not otherwise engaged, would prove the most practical and profitable to the farmer.

With this plan in mind the Case engineers have worked for over two years in designing, building and perfecting, until now they feel confident that the J. I. Case Farm Motor truck has incorporated in it practically every worthwhile feature that a farmer could possibly seek.

Belt Power Take-Off.

One of the features farmers will find most convenient, and which will add much to the value of the truck on the farm, is the power take-off, which can be supplied fitted to the truck. This device delivers practically the full power of the engine to a belt pulley mounted directly in front of the radiator on the driver's seat, making it a simple matter to line up to belt driven machinery. Under field test, it is stated, the engine easily

eral that the two-ton size truck appeared to be much more in demand for farming purposes than the smaller or larger units, and for this reason the two-ton size was finally adopted by the engineers as standard for their product.

Ample Power Developed by the Case Engine.

The engine used is almost identical with the engine used in the Wallis tractor, which is a four-cylinder, four-cycle, I-head type, fitted with removable cylinder head, and with the cylinders cast en bloc. The cylinders are fitted with removable sleeves which are accurately machined inside and out. In case a cylinder becomes scored or worn out-of-round, it is a very easy matter to remove the old cylinder and replace it with a new one, without having to replace the whole block, thus saving both time and money for the owner.

The bore of the engine is $4\frac{1}{4}$ inches and the stroke $5\frac{1}{4}$ inches. The engine operates at a normal speed of 900 revo-

tutions per minute and develops under S. A. E. rating 29 horsepower, figured at 1000 feet of piston travel per. minute. The long stroke gives the greatest possible crankshaft leverage and allows full power from the expansion of gases.

The crankshaft is a full $2\frac{1}{4}$ inches in diameter, and is made of fine grade chrome vanadium steel, heat treated, three-journal type, with flywheel flange cast integral. The crankshaft is given a very careful running balance before assembling and the bearings of the connecting rods and main journals are of babbitt, backed with phosphor bronze, having a total length of $10\frac{3}{4}$ inches. The camshaft is of one-piece construction, having the cams and timing gear flange cast integral. It is drop forged from carbon steel, heat treated, hardened and ground.

Lubrication.

Lubrication is supplied by a combination of splash and force feed. The oil pump constantly furnishes oil to troughs

in the pan under the connecting rod bearings, while an oil indicator on the floor boards shows the driver whether the oil is circulating properly.

The engine speed is under control of a hydraulic governor, as in the Wallis tractor, fitted with an independent control for use with the belt pulley. Hand spark and throttle control are also located conveniently on the steering wheel.

Ignition and lighting is furnished by an Eisemann magneto generator, while a storage battery furnishes current for lights when the engine is not running.

Cooling System.

Circulation of the water through the cylinder jackets and radiator is assured by a water pump of centrifugal type, which is bolted to the side of the engine cylinder block and driven from a gear in the timing gear train. The radiator is of the same type as used by the United States government on heavy artillery tractors. The radiator has a copper core and is provided with a drain at the lowest point. The water capacity of the system is six gallons, which is considered ample for all purposes. The air for cooling the radiator is circulated by a large four-bladed fan mounted in the rear of the radiator and driven by a flat belt from a pulley on the engine timing gear case cover. The fan, it is stated, is capable of circulating 4800 cubic feet of air per minute.

A tractor type of hood is used over the engine and the latter remains open to view on both sides.

This type of hood not only tends to keep the engine cool, but also makes the engine more accessible. The advantages to be gained by using the same engine in the truck and tractor will be appreciated by those farmers and dealers who sell and stock the parts of the tractor, as the tractor engine parts are interchangeable with the truck engine and vice versa.

Clutch and Transmission.

The clutch, which is fully enclosed in the flywheel housing in unit with the engine and transmission gearset, is of the two-disc type and is held in engagement by a spring.

The transmission gearset is of Wallis design and has three speeds forward and one reverse, selective type. The bearings of the main and counter shafts are

of ball construction and of ample size for the truck. The forward end of the transmission housing is provided with a flange which meets the flywheel housing, so that the transmission gearset and the engine are carried by the same sub-frame as the engine.

The Ross steering gear is used, and all parts of the steering linkage, including the steering arm, tie rod and drag link, are made straight, allowing the steering gear to be removed without disturbing the engine.

The frame is built up of six-inch eight-pound channel iron, equipped with the famous patented Wallis U-shaped frame of one-piece boiler steel as a sub-frame. Unusual strength is shown in this type of frame, which is amply braced with cross members of the same dimensions as the main frame, with all joints hot riveted.

The spring equipment is half-elliptic, front and rear, the front springs being 40 inches by 2½ inches and the rear springs 53 inches by three inches. All shackle pins are fitted with oilkips for lubrication, and each pin has a 21/64-inch hole drilled through it, filled with cotton wicking, through which the oil is fed by capillary action. The rear shackles are under compression, and the springs are so designed that they are practically flat under load. The Hotchkiss drive is employed, and has proven its ability in thorough tests to absorb the shocks of the road and to prevent torsional strains and stresses from affecting the body carrying members.

The gasoline tank, having a capacity of 20 gallons, is mounted on the dash and is provided with baffle plates to prevent the gasoline from surging in the tank. The space under the driver's seat is divided into two compartments by a vertical partition, the compartment on the left being again divided into an upper and lower section. The lower compartment is fitted with a drawer in which may be carried the tools, while the upper compartment is used for chains, jacks and other bulky articles. The compartment on the right is used for the storage battery.

An All-Weather Cab.

The cab is a self-contained unit and it is only necessary to disconnect two wires in order to unbolt and remove it

from the chassis. This cab is an all-weather type and is fitted with glass windows, hinged doors and other conveniences such as a driver would require for either summer or winter driving.

The weight of the truck complete, with water, fuel, body and cab is 5500 pounds. The loading space measures 5½ feet by 10 feet inside of the stakes.

The rear axle is the well known Torbensen make, fitted with internal gears operating on tapered roller bearings. This type of axle has unusual ground clearance, which is desirable if the truck is to be driven over soft or sod ground, as is the usual experience of a farm truck.

At 900 revolutions per minute, which is the governed speed, the speed of the truck is approximately 15 miles per hour, the rear axle ratio being eight to one. A truck speed of 20 miles per hour can be easily reached without harm to the engine or its components. Because of the high power of the engine, and the comparatively high reduction ratios, the truck is amply powered.

Power Take-Off.

The power take-off is furnished as an extra and comprises the belt pulley, a pair of bevel bears and a separate clutch. The gears are cut and hardened and mounted on roller bearings, while the entire combination is enclosed in a bath of oil.

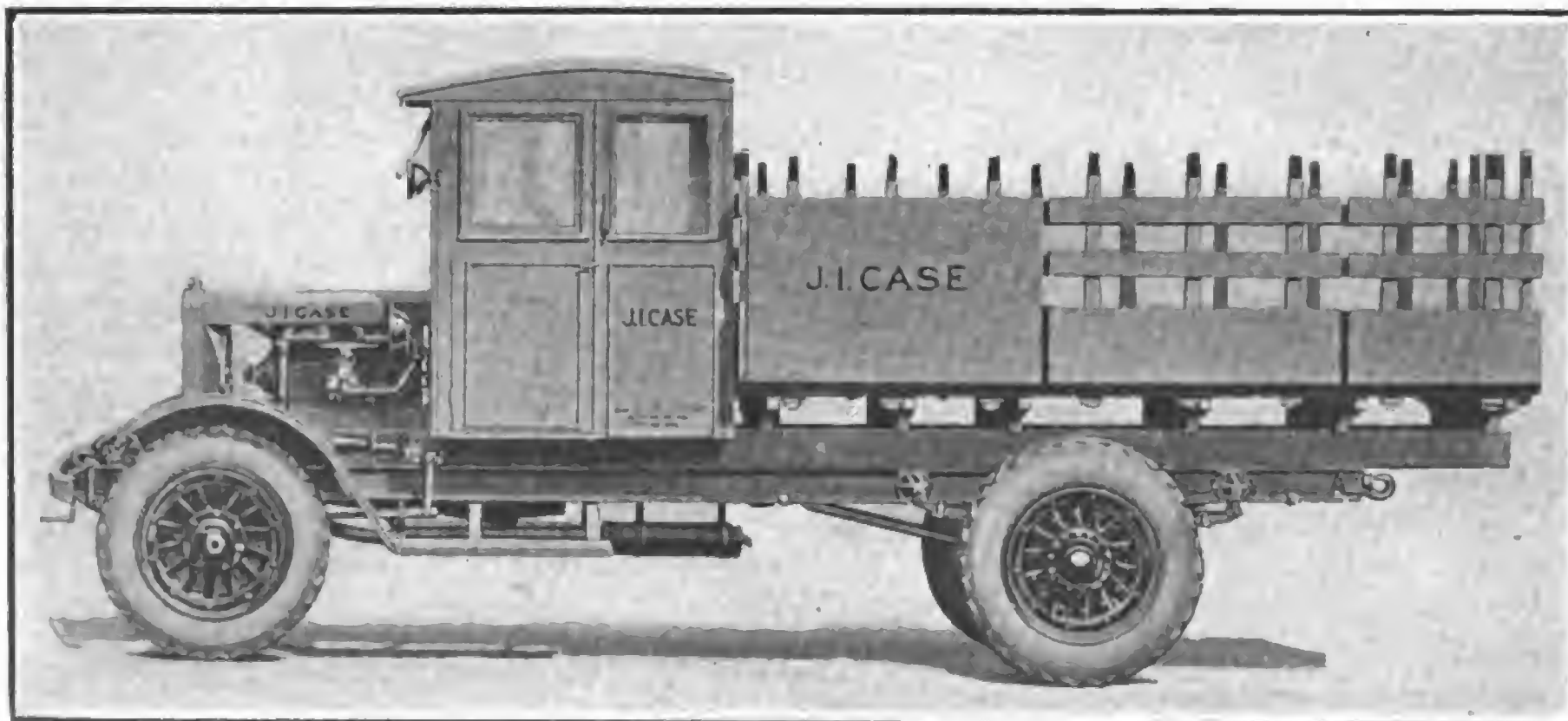
The pulley at crankshaft speed gives a belt speed of 2400 feet per minute. The pulley is 10 inches in diameter and is wide enough to accommodate a seven-inch belt. The pulley is mounted directly in front of the radiator on the driver's side, making it a simple matter to line up to belt driven machinery.

Although the truck may be purchased without the pulley attachment, most of the demand will be for the trucks equipped with this device, as many farmers will find that the device solves the power problem of the farm in a unique manner, as the power take-off device does not interfere with the use of the truck on the road, and is always in position and ready for instant use.

CONTINENTAL PARTS STATIONS.

The remarkable increase in motor car transportation and the huge amount of capital invested in motor trucking this year has made it imperative that the vehicles be kept running to protect the owner against loss through long delays. Realizing this and the fact that a complete and high grade service is the only method by which financial loss can be minimized, the Continental Motors Corporation, largest manufacturers of engines for passenger cars and trucks, has established parts stations in all the principal cities of the country, especially those along the main arteries of motor traffic, making it possible for truck and car owners to get repairs made in a day or less.

These parts stations will carry a most complete stock of all possible parts, which will be kept up by day-to-day shipments from the factory.



New Two-Ton J. I. Case Farm Truck Designed Especially for Farm Service.

KISSEL ONE-TON "EXPRESS" MODEL



Timken Worm Drive Axle of Kissel One-Ton Express.

THE Kissel Motor Car Co., Hartford, Wis., is now in production with its new Express model one-ton truck, which is in keeping with the Kissel idea of building a high grade job with the same standard of workmanship and quality as is built into the four larger Kissel truck models. While primarily the new Express model is built and equipped to maintain a speed of 35 miles per hour with capacity load, unusual care has been taken to make it a full one-ton model, the design of the frame, axles and springs and general appearance being that of a 1½-ton truck.

Among the noticeable features that depart from the usual equipment and common practise in building trucks of the one-ton speed size and capacity, is that it is equipped with the regular Kissel built truck engine, the same engine as used in the Kissel General Utility 1½-ton model. Likewise, the frame and heavy Kissel front axle give an impression of oversize. The latest type of worm drive rear axle is included as standard equipment, the wheelbase is 140 inches and the wheels are equipped with 34 by five-inch pneumatic tires front and rear.

Speed and Economy Two Important Factors.

The manufacturer lays emphasis on the fact that this model is a unique combination of adaptability, speed, ability and economy. The demand by retailers and jobbers for a one-ton speed truck capable of 35 miles an hour, built to stand up under continuous use, strong enough to stand emergency usage and still render uninterrupted service economically and efficiently, prompted Kissel to produce this Express model.

The truck is primarily designed for retailers and merchants who desire a quick delivery truck for speedy work in the city and suburban districts, also for manufacturers and wholesalers who want a light truck capable of fast speed as auxiliary to their heavier models. In addition it is constructed to meet the needs of the farmer for a dependable one-ton truck, equipped with sufficient loading space and having the ability to carry capacity loads at a fast rate of speed.

This model is claimed to be the result of first studying the demands made upon speed trucks and then selecting those

factors that govern performance and economical maintenance.

When the capacity was determined the total weight, engine size, engine speed, rear axle ratios, tire size, speed of the vehicle and low gear ratio in the transmission were harmonized.

The proper selection in combination of these factors produced in the Express model are well balanced power transmission from engine to rear tires, good performance on levels and grades and a low fuel consumption.

General Specifications.

Engine—Kissel built, bore 3⅞ inches by 5½ inches, four-cylinder vertical four-stroke cycle type, having a rating of 24.1 horsepower under the N. A. C. C. The carburetor is a Stromberg, fed by vacuum, and the ignition of the engine is by an Eisemann high-tension magneto. Cooling is accomplished by means of a centrifugal power driven pump, a McCord radiator and a four-bladed fan driven by fan belt from the engine fan pulley. Large water jackets surround the engine cylinders and valve chambers, insuring sufficient cooling under all conditions of work. The valve arrangement is L-head, and the valves are located in pockets in the side of the combustion chambers.

The entire power plant, including the transmission gearset and clutch, is in unit with the engine, and is similar to the power plant used in the General Utility 1½-ton truck. The radiator is of special Kissel design, is cast shell and is composed of four parts, the upper and lower tanks and the two sides, which bolt together, and enclose the core. The core is composed of tubes set vertically and surrounded by radiating fins soldered to the tubes, with the radiator suspended by springs from the truck frame.

The clutch is a multiple disc dry plate type and proves very efficient in operation.

A double universal joint with center bearing is used between transmission and rear axle. This is the well known Spicer joint, all metal construction and requires filling with lubricant at intervals.

The maximum speed of the Express truck is 35 miles an hour and at this

speed the engine turns up to 1785 revolutions per minute.

The frame is made of pressed steel with channel sections five inches deep and 3/16 inch thick.

The springs are semi-elliptic front and rear, the front springs 38 inches long and 2¼ inches wide made of alloy steel, while the rear springs are 50 inches long, 2½ inches wide, also of alloy steel.

The front axle is an I-beam section, 2½ inches deep, Kissel built, while the rear axle is of the latest type one-ton worm drive axle, fully guaranteed for this purpose. The tires are 34 by five-inch pneumatic cords front and rear.

The wheelbase is 140 inches and the tread standard 56 inches.

The prices are as follows f. o. b. Hartford, Wis.:

For stripped chassis standard equipped, without seat, but including two oil lamps, tail lamp, jack, complete set of tools gasoline tank and pneumatic tires, \$1585.

For chassis and body complete, including all extras, such as electric lighting and starter, express type body and top, cord tires, painted complete, \$1985.

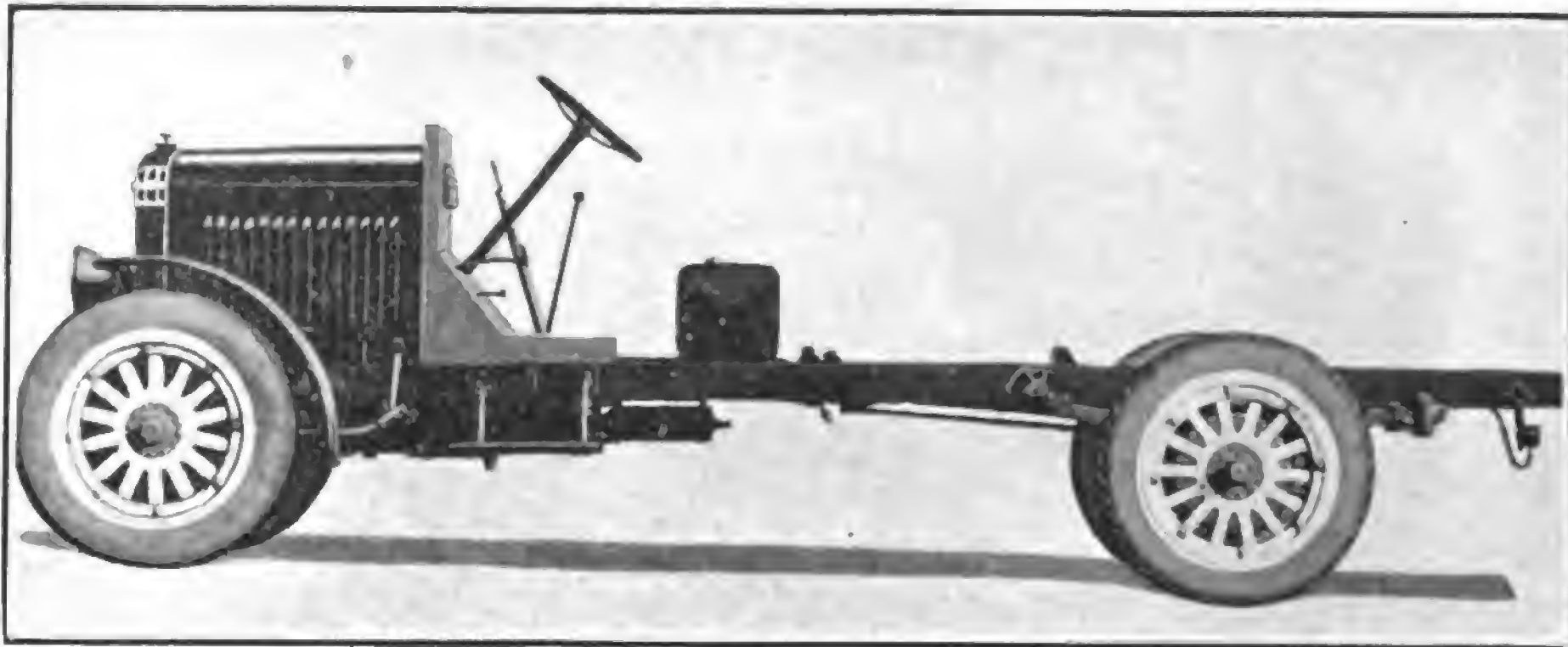
CONNECTICUT PATENTS AGAIN UPHELD IN COURT.

The Connecticut Telephone and Electric Co. has secured a permanent injunction against the Denlinger Lamp & Ignition Co. of Rochester, N. Y., restraining them from the sale of ignition parts violating the patents of the plaintiff of the case.

The decree, issued from Judge Frank Cooper of the United States District Court of Northern New York on Feb. 28, establishes once more the validity of the Connecticut patents, which have previously been upheld by federal courts in several similar cases against manufacturers and distributors.

The Connecticut company is endeavoring by means of court action as well as by the education of the trade, to eliminate from the market all imitation parts.

International Harvester Co. has declared a quarterly dividend of \$1.75 a share on common, payable April 15 to holders of record March 25.



The Kissel One-Ton "Express," for Which Is Claimed Exceptional Strength, Speed and Economy.

STEARNS EXTRA RESERVE ENGINE FOR TRUCKS AND TRACTORS

THE Stearns Motor Manufacturing Co., Ludington, Mich., is now putting out a high duty engine designed by the engineers of the company especially for use in motor trucks and for tractors working with either 2-3 or 3-4 plows.

The Stearns Motor Manufacturing Co. has manufactured engines of this type for some time, but it is only recently that the company has decided to manufacture a larger size engine. Production has been absorbed principally by motor truck and light tractor manufacturers, as the engines were of a smaller type, consisting of model F. U. and F., fitted respectively with closed and open flywheel, having a bore of four inches and stroke of six inches and a rating under the S. A. E. of 25.6 horsepower, and models G. U. and G., H. U. and H., fitted respectively with closed and open flywheel, having a bore of 4½ inches and a stroke of six inches, developing under the S. A. E. rating 32.4 horsepower.

These engines are identical in structural details with the Stearns Extra Reserve engine, but differ from it in dimensions of parts.

Tractor and truck work demands an engine that shall have at all times an extra reserve of power that may be operated at low speeds to prevent racing of the engine and the troubles coincident with vibration. The engine must have great lugging ability at low speed and also show economy in operation, whether operated on gasoline or kerosene. Cooling features of the engine must be amply cared for if perfect results are to be obtained. As the engine is cared for by

the tractor or truck owner it must be easily accessible so that the various units may be readily reached for adjustment or replacement.

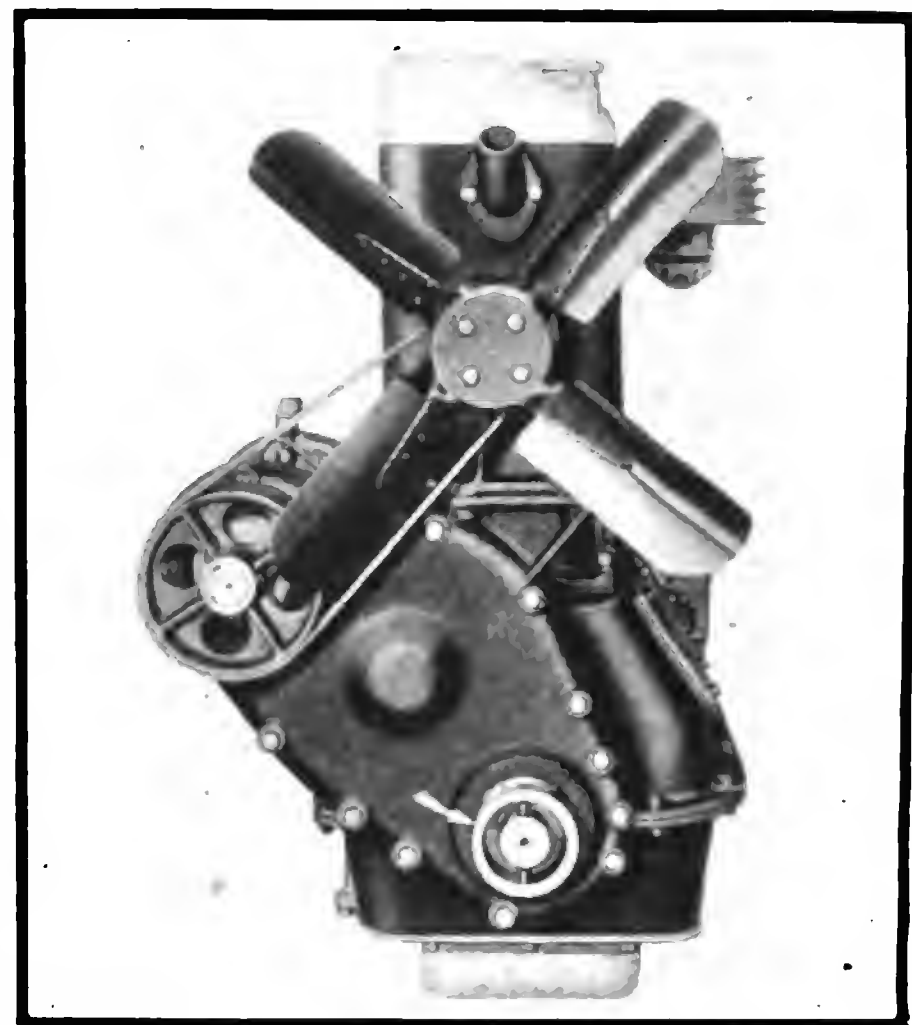
Having these points in mind the engineers of the Stearns Motor Manufacturing Co. set about designing an engine that would be superior to other engines adapted for this type of work. The Stearns Extra Reserve engine, designed for two to three and three to four-plow tractors and motor trucks is the result. The use of this engine as the motive power for large trucks and medium sized tractors is said to insure positive satisfaction because of its tremendous lugging power, its high quality of materials and workmanship, its simplicity, its ability to withstand rough usage and its ease of accessibility.

Structural Features Well Designed.

The Stearns Extra Reserve engine is built with wonderful accuracy in order to secure full power at low cost. The cylinders are accurately ground to size and the combustion chamber is reamed to within .001 inch in diameter. The crankcase is designed to give proper rigidity with minimum weight and is accurately balanced and perfectly ground.

The pistons are ground to within .001 inch. All parts of the Stearns engine are accurately made, thoroughly tested before assembling, and the finished engine is put through rigid tests.

The Stearns Extra Reserve engine is a four-cylinder, four-cycle, water cooled, vertical, I-head type, having cylinder bores of 4¾ inches and stroke of 6½ inches and is rated at 41 horsepower at 800 revolutions per minute; 46 horse-



End View Stearns Engine, Showing Accessibility of Timing Gearset. Arrow Indicates Three-Point Suspension Trunnion Bearing.

power at 900 revolutions per minute and 47 horsepower at 950 revolutions per minute. Under the S. A. E. rating the horsepower of an engine having a bore of 4¾ inches is given as 36.1 horsepower.

The engine is designed for combination with either clutch or clutch and transmission gearset, with bell housing type AU for tractors of unit construction, or in type A, open flywheel type, without bell housing. The unit is built for mounting at three points—at the forward end on a trunnion support and at the rear, on the arms at either side cast integral with the crankcase.

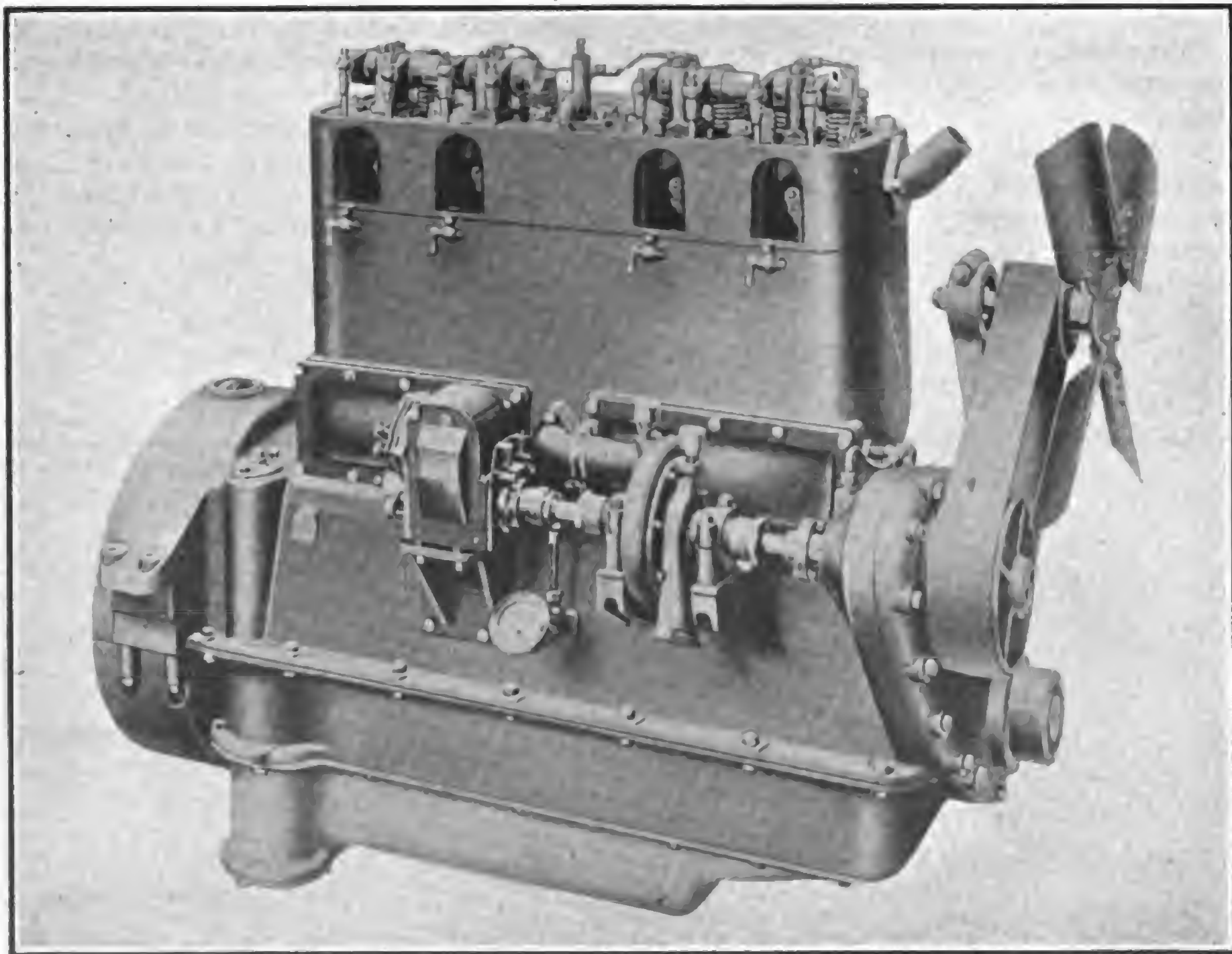
Constructed to S. A. E. Dimensions.

As the engine is designed it is equipped with Dixie high-tension magneto, with impulse starter. As the large size of the engine places it in the heavy truck class, provision is not made for starting motor or lighting generator. Much attention has been directed to security of assembly and all bolts, studs and nuts are S. A. E. standards and are locked with lock washers or cotter pins, and, wherever necessary, as on the studs that retain the cylinder head to the engine block, special nuts are used, and where the studs are screwed into the metal the threads are usually 1½ diameters or more in length.

The cylinders are cast with the water jacket integral, as the head is cast separate. This means that the water chambers are cleared and the circulation is positive, and that the walls are of uniform thickness, which makes for efficiency of cooling and lubrication. The block construction affords the maximum strength and rigidity and the alignment and relation of the cylinders to each other. Each cylinder is uniformly cooled.

Efficient Cooling Obtained.

After the engine blocks have been cleaned and machined the cylinders are



Right Hand Side Stearns Extra Reserve Engine. Clean Cut Lines and Accessibility Predominate in This Heavy Duty Engine.



Disassembled Oil Pump and Drive Members.

bored and reamed and after being subjected to an annealing process are ground to dimensions. The combustion chamber is reamed to within .001 inch in diameter, which insures uniform compression in each cylinder. This accuracy of workmanship insures an economical and smooth running engine.

The heads carry the valves and include the inlet and exhaust ports, the valve seats and the spark plug bosses, all of which are surrounded with ample water chambers. The head is secured to the cylinder block by 15 large nickel steel units, 9/16 inch in diameter.

Exceptionally large water space is provided for and the gas inlet passage is of absolutely uniform shape throughout its entire length, insuring correct carburetion with a minimum amount of fuel. The gas inlet is so designed that it follows the heated exhaust passage, which assists this carburetion. The valve stem guide bushings are pressed into the cylinder head and can easily be replaced when worn.

The pistons are made of gray iron and the tops of the pistons are well ribbed and the wrist pin bosses are strongly supported. Grooves are provided for three piston rings, the lower ring acting as an oil ring. Oil grooves are provided in the piston skirt, which supplies lubricant to the cylinder walls. The wrist pin is locked in place with a liberal sized pin extending through both sides of the wrist pin bosses. This pin, which is of two diameters, is locked in place securely by an ingeniously constructed lock washer. The wristpins are of steel tubing, hardened and ground to dimensions. A bronze bearing fits the wrist pin and is secured in the upper or small end of the connecting rod.

Oiling System Protection.

The lower half of the crankcase is constructed in two sections. The lower section, which is made of aluminum, acts as an oil reservoir and also contains troughs for connecting rod dips and the oil pump. These covers are so designed that all bearing adjustments can be made by simply removing the lower section, which weighs only 15 pounds. This section can be removed without interfering in any way with the bearings or oil piping.

The top section forms the lower half of the crankcase and is fastened to the upper half by 21 alloy steel studs.

The webs that carry the main bearings are heavy and the upper section of the crankcase is extended forward to house, with a cover, the timing gearset. All internal parts of the engine are sand-blasted to remove scale and foreign matter that might find its way into the lubricating oil. The crankcase is made of high grade, close grained grey iron, and

is designed to give maximum rigidity with minimum weight. The main bearings are tied to the side walls with exceptionally wide flanges, and are supported with two heavy ribs. The bearing caps are set in a recess one-half inch deep and held in place by four 5/8-inch steel studs. Two large inspection holes are provided on one side of the crankcase, the covers of which can be easily removed, allowing inspection of the bearings.

The crankshaft is drop forged from a high grade of chrome nickel steel, with the flywheel flange, and the flanges at either side of the journals to take out end thrust integral. The shaft is 2 7/8 inches in diameter, the front journal is 3 1/2 inches long and the center and rear journals 4 1/2 inches long, a total of 12 1/2 inches. The crankpins are 2 3/4 inches diameter and 3 1/2 inches long. The shaft is machined, heat treated and ground to dimensions. The shafts are drilled to afford pressure lubrication of the journals and crankpins.

The oiling system is of the force feed and splash type. A pressure of 25 pounds is maintained on all bearings when the engine is warm, by a large gear pump entirely submerged in the oil reservoir.

The oil pump and drive are in one unit and can be easily removed by simply taking out four cap screws bolted direct to the crankcase and to the main oil header, which consists of a steel tube, cast integral with the crankcase, and eliminates all chance of oil leakage by doing away with all oil tubing. After the oil is forced through this lateral oil passage it is directed through a hollow crankshaft to each connecting rod bearing and through a steel tube to the wrist pin, which insures force feed lubrication under pressure at each and every bearing. The oil is also forced from the lateral passage through a copper pipe to a pressure relief, located on the top of the cylinder head, and which can be adjusted to any desired pressure by simply

removing the plug on the cylinder head cover. The overflow of the oil through this pressure relief lubricates the timing gears. The camshaft is lubricated by large spiral oil grooves, which take their oil from the splash and spray in the crankcase. The engine is also provided with a bayonet type oil gauge and also with high and low level petcocks.

Sufficient oil checks are provided so that the operator has no excuse for letting the oil in the engine reservoir get too low. There is a large oil filler located on the side of the crank case which permits the operator to pour the oil into the engine base without using a funnel.

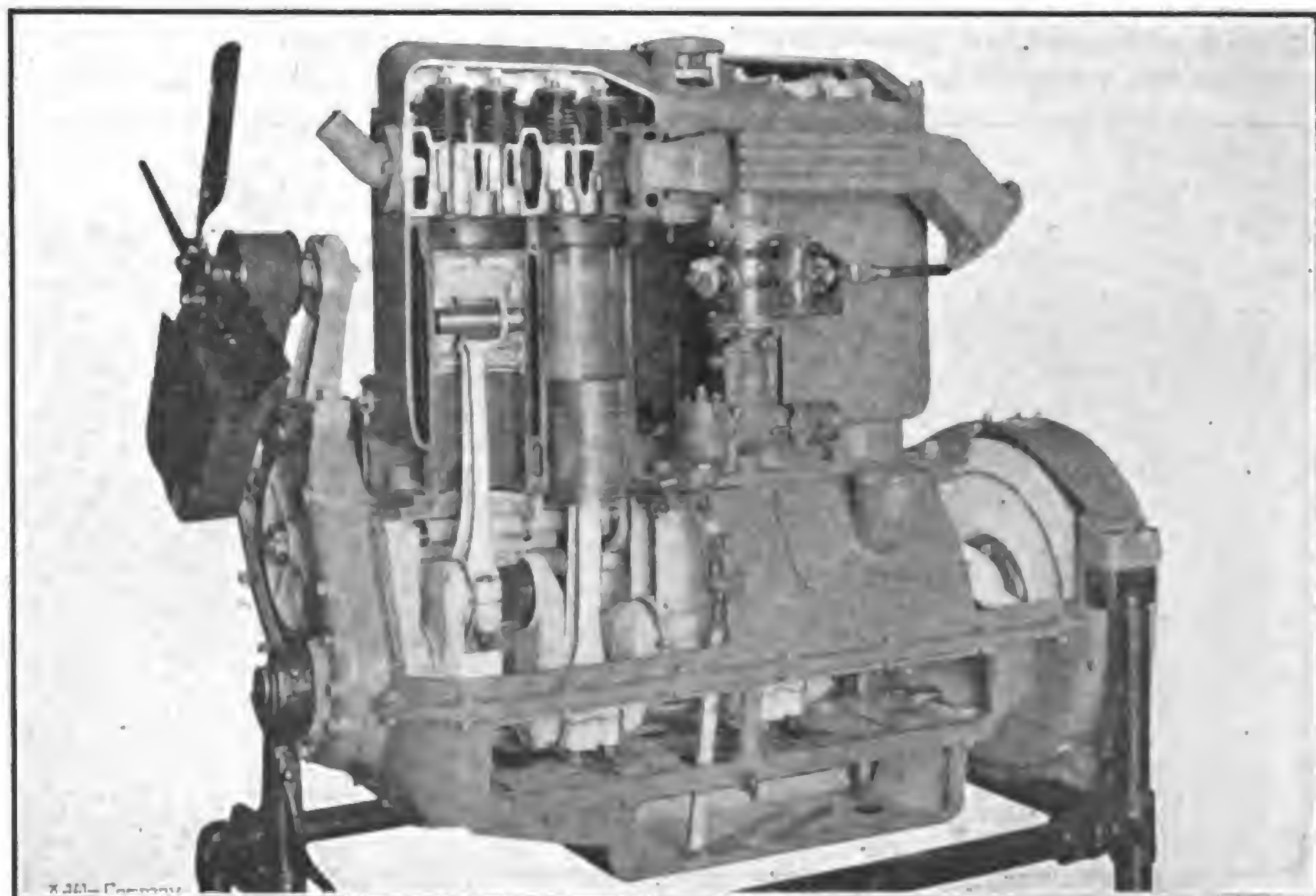
A strainer of ample size is located in this filler so that all oil is strained before it passes into the reservoir of the engine. This filler does not act as a breather and is air tight when closed to eliminate the possibility of dust being drawn into the engine and causing excessive wear of the parts.

The Reciprocating Members.

The camshaft is drop forged from carbon steel and the flange for securing the timing gear and the cams are cast integral. The shaft is carefully machined, case hardened and accurately ground to size. It is mounted in bearings larger than the shaft so that it may be removed as desired with minimum labor. End thrust is taken up through a large flange on the camshaft and through the front camshaft bearing, which is held in place by four large steel alloy screws. The camshaft gear is held in place by a large hexagon nut.

The connecting rods are alloy steel drop forgings, heat treated to give maximum strength. The connecting rod cap is held in place by four 1/2-inch chrome vanadium steel heat treated bolts and extra special long nuts. The wristpin end of the rod is arranged to hold a bronze wristpin bushing.

The main and connecting rods are of the highest grade bronze and are excep-



Sectional View of Stearns Extra Reserve Engine Showing Relation of Units.

tionally large. The main and connecting rod bearings are bronze backed, with high grade babbitt lining, and fitted with oil grooves to insure equalized lubrication, and laminated brass shims are placed between the halves of the bearings to allow for future adjustment. The timing gears are of large diameter, having faces that are helically cut so that they are noiseless in operation.

The crankshaft and the magneto drive gears are of drop forged steel, and the camshaft gear is of high grade semi-steel. This gear drive has been designed in such a way as to eliminate all idler gears, thereby doing away with the greatest source of gear trouble. The engine is also designed so that any standard governor may be attached.

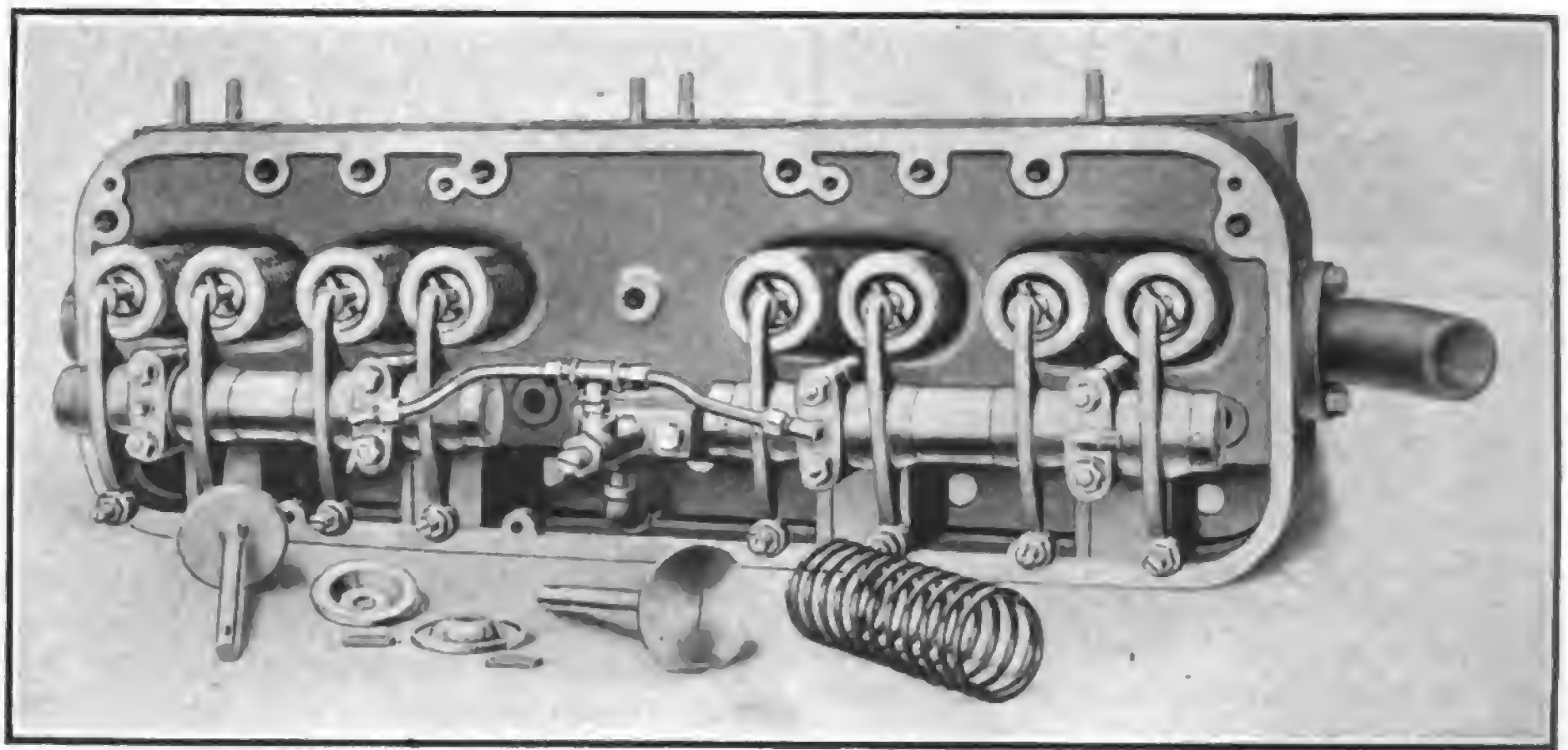
The valve tappets are of the well known roller type of an extremely sturdy and light design. The roller is made of $3\frac{1}{4}$ per cent. nickel steel, hardened and accurately ground to size. The roller pin is made of the same material, flats being milled on the end to insure the roller remaining in correct relation to the cam. With this design the extreme side thrust on the roller is eliminated with a corresponding decrease in wear. The valve tappet bushings are made of high grade cast iron and held in place with a drop forged crab.

The push rod cup is hardened steel and is pressed into the valve tappet, which is also case hardened and accurately ground to size. The valve tappet bushings are of high grade grey iron which, in connection with the case hardened valve tappet, well lubricated, have an extremely long life. The valves have a clear opening in throat of $2\frac{1}{4}$ inches.

The push rods are enclosed in cylinder block casting, in chamber separate from the water jacket, and is provided at the lower end with two large openings, providing access to the push rod and tappet assembly.

Manifolds Cast Integral.

The inlet and exhaust manifold are cast integral and are so designed that the heat of the exhaust gases sufficiently increase the temperature of the fuel to



Cylinder Head Showing Rocker Shaft, Rocker Arms, Valves, Valve Springs, Etc.

vaporize it quickly, and claim is made that this feature insures operating efficiency, fuel economy and prevents the dilution of the lubricating oil in the crankcase. The manifold is seated on copper-asbestos gaskets and secured to the cylinder block by heavy studs.

The rocker arm assembly is rigidly supported by two brackets. Rocker levers are made of carbon steel, case hardened on valve end and threaded on the other end for valve clearance adjusting screw. This screw is case hardened and has an extremely large ball end, which fits into a cup on the push rod so arranged that the lubricating oil will settle in it and assure absolute lubrication.

The rocker shaft is seamless steel tubing, heat treated to the scleroscope hardness of .45 degrees, which is claimed to insure good wearing qualities. Oil is forged through this tube under pressure to all rocker arm bearings, thus eliminating the use of compression grease cups.

The breather differs from conventional practise in that it is located on top of the valve mechanism cover instead of at the top of the crankcase. The breathing action is taken up through the push rod chamber, through the cylinder head cover, and by the time it reaches the breather the action is reduced to a very low point. In addition the breather is provided with a diaphragm, which is

claimed to prevent any inward action, but which allows all pressure in the crankcase to be released. The entire engine is enclosed and with this breather arrangement it is practically impossible for dust to enter. A further advantage of the breather location being on top is that there is a continued oil vapor through the push rod chamber, which in turn lubricates the valve stems, valve springs and the valve adjusting screw ends.

Engine Cooled by Centrifugal Pump.

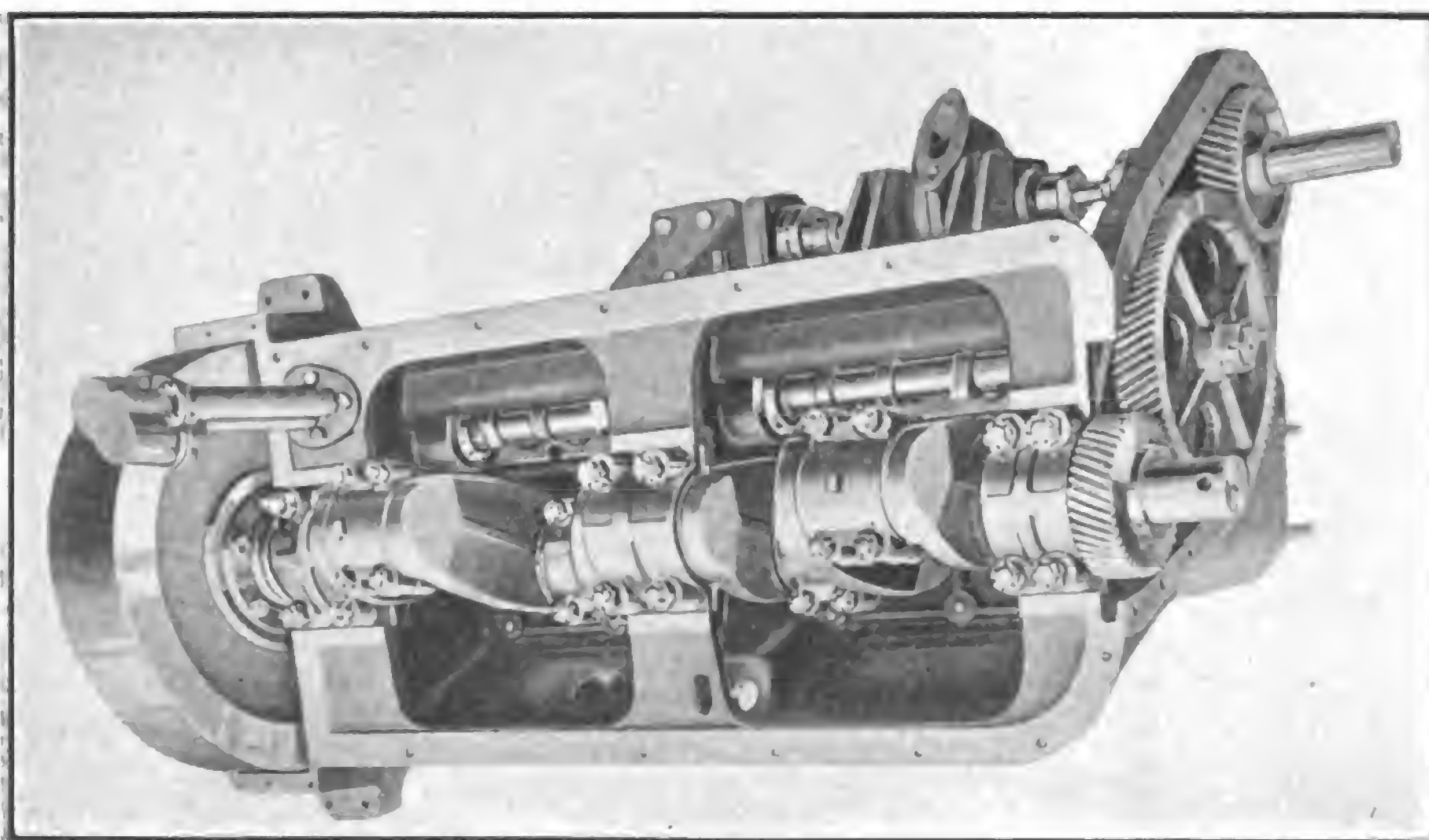
Conventional practise is followed in the cooling of the Stearns Extra Reserve engine in that a centrifugal water pump is mounted on the side of the engine, driven by a shaft from the timing gear-set. The pump is of ample size to insure perfect cooling and is provided with large capacity compression grease cups, which thoroughly lubricate the pump bearings. Stuffing boxes are fitted at each side on the drive shaft, which prevent the water in the pump from working through.

The pump is rigidly supported by two brackets bolted to the crankcase and can be removed easily by removing four hexagon nuts. Adjustment of the fan belt is by means of a cap screw and turning an eccentric located in the fan bracket, which has sufficient eccentricity to allow for one-inch fan belt adjustment.

The Stearns Extra Reserve engine is constructed for the use of kerosene as fuel and for gasoline. There is a difference in these models in order to provide for the variation in the weight of the two fuels.

Exhaustive tests of the Stearns Extra Reserve engine were made at Armour Institute of Technology, Chicago, Ill., which seems to indicate that this engine has a large amount of reserve power at low engine speeds between 800 and 900 revolutions per minute and showing excellent torque characteristics at these speeds. It was determined during the tests that at practically all running speeds the engine showed a fuel consumption of less than $\frac{6}{10}$ of a pound, or about $\frac{8}{10}$ of a pint per horsepower hour.

This engine is now being produced commercially and will be built in quantity.



Crankshaft Assembly Showing Accessibility of Main Journals, Connecting Rod Bearings, Timing Gearset, Etc.

HIGHWAY TRAILERS IN CITY SERVICE

THE Highway Trailer Co., Edgerton, Wis., manufacturer of two and four-wheel trailers of one to 10 tons capacity, has a fleet of four-ton, four-wheel, reversible trailers, equipped with three-yard, two-way steel dump bodies of its manufacture, in use by the Greater Winnipeg Water District of Winnipeg, Manitoba.

The Greater Winnipeg Water District is a public owned organization, which supplies water to the city of Winnipeg and the surrounding municipalities.

Along the railroad line which runs parallel to the aqueduct are gravel pits and the district has developed these so that they supply the city of Winnipeg with all of its road building material from their own pits, hauling on their own railroad to their bins and distributing the gravel to the various jobs about the city with six 3½-ton trucks and six Model N4, four-wheel Highway trailers, equipped with side dump bodies.

The average round trip haul is eight miles, mostly over paved streets. The cost of operating the above units is stated to be 17½ cents per yard mile.

During the month of August the complete fleet ran an average of 18 hours per day every day in the month. During this period they hauled an average of 450 yards per day, or a total yardage during the month of 11,700. Half of this was carried on trucks and half on trailers.

A statement from the Greater Winnipeg Water District claims that when hauling trailers, the trucks make about 75 per cent. as many trips as they make without trailers. This is due to the loss of time in turning around in streets that are torn up for paving. Gas consumption remains about the same, whether hauling trailers or operating the trucks separate. Six yards are hauled per trip with the truck and trailer and only three yards per trip when the trailer is not used.

These people now employ a total of 23 units and find that they are cutting their costs practically in half with the use of trailer equipment.

Recently additional units have been purchased, including five carloads for garbage and refuse hauling. This type of trailer differs from the former in that it is of 2½ tons capacity, equipped with a 4½-yard two-way steel dump body. The drop frame of the trailer is shackled to the springs and suspended on the same principal as a hammock. This permits the loading not to exceed 60 inches from the ground and has proven a very practical unit for collecting ashes and garbage by means of teams and later transporting the load in the incinerator or dump by hauling at least three units at a time with motor truck or tractor.

Trailer units are stated to offer a satisfactory solution to municipal owned companies for the handling and disposal of refuse collected in cities, and by dividing the cities into zones or districts the refuse can be handled in a more scientific manner, with assurance to house-

holders that collections will be made at regular periods.

Description of Trailer.

The trailer for general commercial and municipal work offers many advantages, chief among which is the cost as compared to the outlay for new truck units.

The cost of a trailer is usually about one-third that of a completely equipped motor truck, according to figures furnished by the company, while the operating cost per day of the motor truck hauling the trailer is claimed to be but slightly more than what it would cost to operate the truck alone. It is further stated that each trailer hauls practically double the load of the truck and the operating cost of each trailer is from \$3 to \$4 per day, or less than one-fourth the cost of operating a truck of equal capacity.

The smaller size of Highway trailer, Model A-4, has a carrying capacity of 1½ tons, with a body allowance of 1200 pounds. The length of the frame, which is of I beam construction, hot riveted at all joints, is 12 feet and the width 35 inches. The height from the ground is 33 inches and the depth of the frame channel four inches. The frame throughout is constructed of steel, heavily reinforced with steel cross members and steel plates at the corners and ends, hot riveted to the side frame and end members. Heavy steel bolsters are fitted front and rear equipped with a king pin in the center to which the draw bar is pinned. Steering is accomplished by a special Highway equalizer centered on the draw bar and operating through two drag links to ball joints on each of the wheel spindle arms. The tie rods are placed in front of the axles, are adjustable and fasten to the wheel spindle arms at the rear of the ball joints.

Reinforcement of the frame corners is by means of heavy corner castings with a ring cast integral, which allows a hitch to be made when desired that will make possible the pulling of the trailer at extreme angles. This corner casting also binds to the main frame the steel frame work which supports the draw bar in a horizontal position.

The springs are four in number, composed of 12 leaves, each two inches wide measuring from center to center 42 inches. Heavy cast shackles are fitted to the frame at each end fitted with hollow steel bolts and compression grease cups, which supply lubrication to the spring bushings.

Continental I Beam Axles.

The axles are Continental drop forged I beam type, fitted with Timken roller bearings, and the wheels are of wood, having 14 two-inch spokes to each wheel and shod with 32x3½-inch solid rubber tires.

The ground clearance is 11 inches, the wheelbase 90 inches and the weight 1750 pounds.

Other models in the line manufactured by the Highway Trailer Co. are as follows: B-4, 2½ tons; N-4 four tons; P-4, six tons and the L-4, which is designed especially for four-wheel drive trucks and tractors. Specifications of the four larger models vary from those given for the A-4 only in size of dimensions of parts, carrying capacities, etc., the general structural details of the trailers being the same.

EDUCATION IS BEST WEAPON OF INDUSTRY.

The Travel and Transport Bureau of the B. F. Goodrich Rubber Co. points out four problems that are up for solution before the truck industry. They are: Formation of local associations to eliminate rate cutting and other harmful practices; expanding in the field of junction terminal transfer of freight; to break shippers of the "exclusively railroad habit" and educate them to use motor trucks for short hauls; and to warn truck operators against overloading and overspeeding in order not to antagonize highway authorities.

Summed up the problems of the trucking industry are largely educational, education of the public to the service performed by the motor truck, and education of the motor truck operator to the use of better business methods.



Type of Highway Trailer Which Has Proven Highly Economical in Service of the Greater Winnipeg Water District, Winnipeg, Manitoba.

The Far East An Undeveloped Automotive Market

Millions of People Await the Lesson of Truck Utility—Busy Cities, Huge Plantations, Vast Industrial and Agricultural Enterprises Lack Modern Transportation Methods—A Field For Exploitation.

(By GEORGE L. LOGAN, New England Manager, Bureau of Foreign and Domestic Commerce, Just Back from Extended Consular Service in Far East.)

(Concluded from March Issue.)

The average size of the Chinese farm is quite small and labor is extremely cheap. There is not a sufficiency of work animals and one often sees a bullock and donkey hitched side by side pulling a plow. I have seen a Chinese farmer pulling alongside an ox with a Chinese woman driving. When the good roads movement now under way in China and the development of its railways are more fully accomplished, the demand for trucks, tractors and motor cars will be tremendous. As a producing and purchasing field China is immense, but only in its beginnings. Its possibilities are scarcely more conceivable than the seconds of eternity. New terminology would have to be created to state them were they fully known or anticipated. Its hundreds of millions people present fan power, productive capacity and consuming ability beyond comprehension. The statement that if each Chinese added an inch to his shirt tail the textile mills of the world could not meet the increased demand for cloth is probably true. Notwithstanding the vast tracts of land under cultivation, but by the most primitive and laborious methods, millions of acres lie untouched in all their virgin fertility. If development proceeds as hoped for, planned and expected, what a field for American enterprise in almost every form of endeavor lies at our very doors. And of all the people of the world none enjoys the confidence and abiding faith of the Chinese so much as the Americans. He believes in us in that enduring way which is typically oriental.

Human Beasts of Burden.

Transportation is fully as primitive as

agricultural methods. Men, women and children are the common beasts of burden. It is cheaper to hire coolies than to buy and keep horses and work cattle. Such animals grow old, become disabled, get sick and die. Replacement means money. But for every coolie that drops out a thousand are ready to replace him at pitiful daily wage and without investment. In 1916 I saw 60 coolies pulling a road roller in Tientsin. The European foreman said that was cheaper than buying a steam outfit, paying for coal and for skilled laborers to operate

ground, which should and will amply reward proper endeavor and cooperation.

Motor Roads in Japan.

The average size of Japanese farms is less than two acres. They are really gardens and are intensively cultivated by laborious, but effective methods. There is some importation of tractors and trucks into Japan for use on the sugar and tea plantations of Formosa, and for soya bean and soghum plantations in Manchuria. Considerable interest is being taken in the development of first class motor roads in Japan, which,

if carried out, will mark a new era for that progressive, rapidly modernizing country.

On Dec. 31, 1919, there were more than 3000 motor cars registered in Japan. You can hire a taxi in any important Japanese city. A company has been organized for the construction of a first class motor road and operation of a motor transportation system between Kobe and Osaka. Twenty buses and 10 trucks have been ordered from the United States for passenger and freight carrying traffic between those two important ports. That will be in addition to a 20-minute

street car schedule and an hourly train service for busy hours. It is planned also to continue the motor line to Kyoto, the ancient capitol and a popular tourist resort, where the Emperor is always crowned and where royal remains find their final resting place.

An important industrial project, one of the biggest in the world, is the proposed construction of a hydro-electric plant to furnish power for the electrification of 500 miles of the government-owned railways, and light and power for



Trucks in the Philippines—1, Motor Buses Are Operated Wherever Good Roads Are Available; 2, Hauling Rice to the Railway by Truck; 3, Getting a Load at the Warehouse; 4, Trucks Coming Into General Use for Local Transport Purposes.

it Fancy, if you can, a big ice wagon, carrying three or four tons, pulled by men and women on its daily delivery rounds.

Those conditions are changing rapidly and as industrial enterprises expand, as modern agricultural, transportation and production methods are introduced and increasingly employed, the economic conditions of China and its multitudes will improve correspondingly. And that will mean markets for American manufacturers, especially for those early on the

Tokyo, Yokohama, Kobe, Osaka and other important cities.

Japan is and probably will be for some time our largest Oriental customer, but we buy there more than we sell.

Indo-China Neglected.

French Indo-China, which has a population of 16,000,000 people, about 6,000,000 more than the Philippines, is the most densely populated and the most productive of all the French colonies. Saigon, about 60 miles in the interior, on one of the crookedest rivers in the world, is its chief commercial center and port. Through that port passes more than two-thirds of Indo-China's import and export trade. I spent a few days there last April and as our vessel, which berthed at the upper end of the harbor, passed through the port district, I counted 26 sea going vessels, 12 of which were flying the American flag. I spent a week there in 1917 and there was not then and had not been for some time an American ship in that harbor excepting small rice boats of Philippine registry.

Rice is the chief export from Indo-China, following which come rubber, copra, cotton, sugar and kapok. Manufacturing is in its infancy, but there is some production of cement, matches, beer and soap. The principal imports are cotton goods, silk, jute bags for rice, iron and steel products, canned goods and automobiles. In Saigon recently I counted 72 American automobiles of one popular make which had just been unloaded from the SS. Santa Cruz of the Pacific Mail Line. French products are given preference, but there is a good market for such of our manufactures as are suitable to a tropical country.

Tiger Hunting by Motor.

There is a good but not extensive system of first class roads in Indo-China and there are several miles of broad, well paved, well kept streets in Saigon, Haiphong and other cities. The automobile is popular and there is a considerable demand for American cars. Tiger hunting de luxe by motor car over first class roads is a popular sport at night. We drove recently 125 miles into the jungle at a good rate of speed with a search light on the front of the car, which was swung back and forth by an Annamite body, who stood on the running board. Whenever a pair of eyes flashed out in the darkness five rifles were trained on them. Natives came along the next day and took the skins. Tiger, panther, leopard and other skins are purchasable at low prices in Saigon from street vendors and in shops.

The rubber industry is developing rapidly in Indo-China. There is now a definite need for trucks and tractors, but educational effort may be necessary to bring that market up to a full realization of their economies.

U. S. Engineers in Siam.

Siam has been somewhat backward in industry, commerce, transportation and local development, but a new disposition is now manifesting itself there. The Siamese have many excellent qualities and the King is a well educated, progressive man. Although handicapped, per-

haps, by a maze of treaties and an ultra conservative council, he is actually accomplishing a great deal in the development of his kingdom. Siam is primarily a rice growing country and he is giving personal attention and encouragement to an important irrigation project, now under way, under the supervision of American engineers. That country is the fortunate possessor of immense deposits of tin and wolfram ore, and has large areas of fertile and arable soil. The railway line linking Singapore, Penang and Bangkok was completed and opened to through traffic on July 1, 1919. Further development is now proposed or under construction which will link Bangkok with Saigon and Rangoon, and open up for development vast tracts of virgin jungle, passable only on elephants' backs, but which is almost certainly suitable for rubber, cocoanuts, oil palms, tapioca and other tropical agricultural products and which probably contains tin, wolfram and oil deposits. Our British friends are wide awake to the possibilities of Siam and have several fully staffed consulates in that small country, while we have a vice consul at Bangkok, who is a druggist and who will visa your passport or sell you a box of pills.

There has not been much road development in Siam, but steps are being taken to correct that omission and an American engineer has been employed recently to make preliminary studies and plans for a definite road building programme. The city of Bangkok is well provided with excellent streets and a considerable number of motor cars and a few trucks are found there. Some tractors have been introduced for agricultural purposes and it is understood that they are being used also in connection with irrigation works. It is said that highway construction in Siam is limited almost entirely to the building of suitable roads for the automobiles of the King and his entourage when making royal visits throughout his kingdom, but that after his departure the roads are allowed to fall into disuse. The rapid growth of tropical vegetation quickly obliterates all traces.

Market in British Malaya.

As an actual and potential market for

trucks, tractors, suitable agricultural equipment and other labor saving machinery, that part of the Malay peninsula under British control, protection or influence stands near the top of the Oriental list when compared with its neighbors as to area or population. It probably leads in wealth per capita, in first class road and railway mileage and in agricultural and industrial development. Government revenues are in excess of expenditures, all classes are prosperous and many are wealthy. Great fortunes have been made and are being made in rubber, tin, copra, tapioca and other products. Singapore and Penang are free ports and are spending millions on port improvements and modern cargo handling facilities. They are important collecting and distributing centers for exports and imports. British and Chinese interests predominate, but Americans are beginning to find a foothold. Within the past three years approximately 50 American firms have established branches and offices in that trade territory. The need for suitable machinery and equipment and the ability to pay therefor are coexistent and, within its limitations, that field is very inviting to American manufacturers whose products are suited to tropical requirements. Our goods are well liked and many European, Chinese and American merchants are keenly desirous of making distribution arrangements for saleable American products.

Thousands of U. S. Cars.

Dealers are finding it difficult to obtain enough motor cars and motorcycles to meet the demand. There are now between three and four thousand motorcycles in use, representing British, Japanese and American makes, and more than 12,000 motor cars, principally American. Every agent for a popular American car is behind on deliveries. The distributor of a certain well known automobile told me that he closed the year 1919 over 2000 cars behind on his orders. When I left Singapore in April premiums as high as \$500 were being paid for preferred position on waiting lists for certain American motor cars.

The Dutch East Indies (Java, Sumatra, Dutch Borneo, the Celebes and other



Present Method of Carting Gum Dumar in British Malaya, Suggesting a Field for the Motor Truck.

possessions), rank third in sugar production and second in sugar exports. Java's production of sugar last year was more than 1,500,000 tons, a large part of which came to the American market. The vessel on which I travelled recently from Japan to the United States brought approximately 2000 tons of Java's 1919 sugar crop, which I was told had been held in storage at nominal rates in Kobe for several months. It is noteworthy that there has been a large increase of sugar production in the Dutch East Indies during the past four years, although the acreage has increased but slightly. This is accounted for by improved methods of cultivation and processing. American machinery, equipment and methods are entitled to their share of the credit.

Tire Plant at Sumatra.

Sumatra has long been famous for its tobacco, but it is coming into greater prominence now because of its rubber. Important American companies have extensive plantations there and are increasing their acreage. The Dutch government is lending every proper encouragement to such enterprise. An American corporation is building a \$7,000,000 tire plant at Medan, Sumatra. African oil palm plantations are one of the most promising new developments of the near future. Copra, kapok and pepper are important products.

Government is spending a large sum of money in creating the port of Belawan, near Medan. The work is well under way, but will not be completed for perhaps two or three years. Mr. Wouter Cool, who had a great deal to do with the planning and preliminary work of that enterprise was recently in the United States studying port and terminal facilities and modern methods of handling cargo. I was expecting him in Boston, but cabled instructions required him to proceed to Holland before he could visit this port.

Merchant Marine Helps Trade.

The development of our merchant marine in Oriental waters is one of the most helpful aids to our commercial welfare in far eastern countries. When I was in San Francisco last June I was told that the shipping board had allotted 12 new passenger-carrying cargo ships to the trans-Pacific traffic. The building up of our trade in the Far East has been retarded by lack of such passenger accommodations. Our commercial representatives, if unable to journey readily and comfortably from port to port, are handicapped in their order taking efforts, but if they can travel expeditiously they can secure business and thus provide both-way cargoes for our ships, which is important. We have lost untold amounts also because merchants who planned to visit the United States were frequently compelled to forego their trips or go via Europe for lack of passenger steamer facilities to the United

States. Some got no further than Europe. In Manila and Hongkong as recently as last May, people were offering bonuses of as much as \$500 for steamer reservations to Pacific ports, in addition to the first class fare of nearly \$400.

Although we have increased our tonnage greatly, we are not yet carrying the bulk of our sea borne commerce in Oriental waters. I was told officially in Manila last May that notwithstanding the considerable increase in American shipping at that port, the larger part of the trade between the islands, the United States and other countries is being carried by British and Japanese vessels. For the first five months of 1920 ships flying the British flag were in the lead at that port as to number of vessels and quantity of cargo.

The development of communications, mail, cable and radio, should go hand in hand with improvements in transportation facilities. We need better cable service, more high powered radio stations and improved mail service with Oriental countries. Our ships should be equipped with wireless outfits that have a wide sending and receiving radius. I



Tractor Plows Are Coming Into Use on the Sugar and Other Plantations of the Philippines.

have seen our vessels come into port quietly and unannounced and go out light because cargo was not on the docks waiting for them, while shippers were clamoring for bottoms. Their accumulations of rubber, tin, copra or other cargo was stored inland for reasons of economy and because warehouse space is limited, congested and at a premium in practically every Oriental port of importance. A few days notice is necessary to enable freight offerings to be brought into town and placed for loading. Vessels that give ample notice of arrival or which maintain a definite schedule usually get all the cargo they can handle and are frequently offered more. I was on a tramp vessel recently that had gotten under way leaving port, but was called back because additional cargo had just come in. Such handling of our ships is economically and commercially inefficient. A greater use of trucks would minimize the difficulties attendant upon bringing shipments quickly and on short notice from interior points to ports of embarkation.

The Truck and the Airplane.

Perhaps nothing is more indicative of

progress today than the development of aviation. Advancement in one sphere of endeavor means development in all others that touch upon it. Rapid mail, express and passenger carrying air craft will necessitate improved land transportation, if such quick service is to yield its maximum benefits. There is a close connection between shipping by truck and travelling by airplane.

Our development in aviation is cause for pride, but it is doubtful whether we are leading the Orient in its practical employment. Certainly the Far East is not lagging behind. Practically every country there is taking an interest in its advancement. China was one of the first to lend active aid and encouragement to aeronautics before the war. Captain Tom Gunn, an American born and trained Chinese aviator, was given his commission by Dr. Sun Yat Sen during the revolution which overthrew the Chinese monarchy and made that country a republic. He reached Manila with two hydroplanes, but the revolution had ended. He made several exhibition flights in the Philippines and was one of the first aviators in that field. Miss Cora Wong, an American trained Chinese nurse in the Philippine General Hospital at Manila, made a flight with him and has the distinctive honor of being the first Chinese girl to fly. Today airplanes are so common in Manila and its environs that one scarcely notices their buzzing and even the natives have ceased to look up in wonder at this great human achievement.

A regular air service between Manila and the Southern Islands is now probably a reality. In Manila recently I was informed that the government had approved its establishment and had authorized the purchase of five hydroplanes for mail and passenger transportation between that city, the Visayan Islands and Mindanao. It is probable that this service will be extended to neighboring ports, such as Shanghai, Hongkong, Kobe, Saigon and Singapore. It takes two days to go from Manila to Hongkong by steamer, but only a few hours by airplane. With air service American mail arriving in Hongkong in the morning can be distributed that afternoon in the Philippines.

The Far Eastern Transportation Co., backed by American and Chinese capital, has been organized to establish mail and passenger service between the ports of Canton, Hongkong, Swatow, Amoy, Foochow and Shanghai, and with the Philippines via Taiwan. It is planned by that company to explore by airplane the trade routes of China and Central Asia.

London to Shanghai by Air.

The Anglo-Chinese Aviation Co., a British-Chinese corporation, plans to establish air service between London and Shanghai via Cairo, Bombay and Hongkong. It is estimated that a flight from London to Shanghai will require some-

thing more than a hundred hours. British aircraft manufacturers are said to have secured important concessions from the Chinese government and it is reported that China has asked the British government for an aeronautical adviser.

Airplanes and hydroplanes have been ordered by the colonial office of the Dutch government for mail and passenger service between Holland and the Dutch East Indies. In Siam there is an aviation corps attached to the Siamese army and it is reported that they are developing some "aces." In British Malaya an enterprising Chinese recently imported several airplanes for service between Penang, Singapore and Bangkok, but an unfortunate accident in the first flight discouraged further attempts for the time. A committee of three prominent Americans recently toured the Orient, arousing interest in the World's Aerial Derby and appointed commissioners in important far eastern cities.

The Cooperative Spirit.

These are some of the developments now under way. Others are in contemplation and will surely follow. Do American merchants and manufacturers realize the wonderful opportunities that these facts pre-
 sage for the advancement not only of their interests, but of their competitors' as well? Do they understand that only by cooperation in such development can they share in its benefits? Are they ready and willing to keep step with our friends on the other side in such advancement?

Our Pacific coast cities are wide awake to the advantages afforded by the quick dispatch of mail and are showing a disposition to hold their own with their neighbors across the sea. An international mail service was recently established between Seattle, Victoria and Vancouver and I had the opportunity of witnessing some of the preliminary flights. By utilizing that service, overseas mail can be pouched at Seattle, for example, up to a short time before a steamer sails from Vancouver, shot through by airplane, landed in Hongkong in record time, picked up by airplane and delivered in Manila, Shanghai, Singapore and other nearby ports a few hours later. By such rapid mail transit one or more weeks can be clipped from ordinary schedules.

English Tongue in Orient.

English is the tongue of trade in the Orient and its use is spreading. Translations into other languages and dialects are dangerous unless made by skilled linguists, thoroughly familiar with current idiomatic phrases and with your products. School book phraseology may result in ludicrous or shocking expressions. The safest course in your correspondence with Oriental firms is to write in English, perhaps sending an unsigned paraphrase in French to Indio-China and in Spanish to the Philippines when occasion suggests.

To be successful in international trade we must know what articles are in demand; the conditions under which our products must "make good;" the competition we shall have to face; the proper methods of packing, so that our wares shall bring profitable sales instead of vexatious claims; the right way to prepare necessary documents, to save our customers needless annoyance and expense from our ignorance or indifference; the quickest and most economical routing, and the sources of dependable credit data. We must be adaptable and willing to put ourselves in the other fellow's place, see things as they are from his viewpoint, and extend to him the same courtesies and consideration that we should expect for ourselves.

In the development of our foreign commerce, the Bureau of Foreign and Domestic Commerce, a governmental organization created for your benefit and supported by you, can, will and wants to render every possible and proper assistance to American business interests. It is constantly collecting, collating and distributing dependable, up-to-the minute data which you can utilize advantage-



The Primitive Way in Which Hemp, with Which the Philippines Supplies the World, Is Brought Into Manila. The Production of Hemp May Be Increased to Meet Any Demand.

ously. If you are a manufacturer or merchant producing or selling American products for or suitable to export trade, you ought to be on the bureau's mailing list. Its service costs you nothing except that some of its publications are sold at a nominal price to cover printing charges. The data it supplies if obtained through other sources would require large but unnecessary expenditures.

Harding Advocates Greater Foreign Trade.

President-Elect Harding said recently in an interview:

"I think it is the government's function to foster, encourage and assist in the expansion of foreign trade at the present time, contemplating our tremendous development of productivity, our advanced position in the development of machinery and what is recognized as outstanding American efficiency.

"A great service our government can render is to put its consular agents to work finding out markets throughout the world for the expansion of trade, thus

allowing us to continue our unparalleled productivity and find a market for our excess in foreign countries.

How Bureau Helps to Develop Foreign Commerce.

"As to the Department of Commerce, my own thought is that it ought to be made the greatest agency of business expansion for this republic that we have. We have not done one-tenth of what we ought to do."

We face a new era big with promise. In the development of our overseas commercial interests shall we be content simply to follow the trails our competitors have blazed, discovering nothing new, adding nothing worth while and discarding nothing as unworthy? With our energy, enthusiasm and initiative, typically American, shall we be less painstaking and determined than the German, less patient and dependable than the British, less persistent and persevering than the Japanese? Or shall we not set a new pace, establish a new record for the other fellow to meet if he can? We have done that in many other spheres of activity and usefulness, why not in this?

"The busy world shoves angrily aside

The man who stands with arms akimbo set

Until occasion tells him what to do;

And he who waits to have his task marked out

Shall die and leave his errand unfulfilled."

REO DINNER AT BOSTON.

More than 200 members of the Linscott Motor Co. organization handling Reo cars throughout New England attended the annual dinner at the Boston City club show week. It proved a very enthusiastic meeting. After President

George A. Patten gave a welcome to the gathering he introduced as toastmaster J. M. Linscott, who is the largest Reo distributor in the country.

Mr. Linscott made a brief address in which he told the 25 bankers present some facts and figures about the industry and the policy of his company. He stated that from Aug. 1 last his company had received and sold 1150 Reo cars and trucks, and that his books showed no season of depression, for of all his time sales but one per cent. did not go through.

Then he called upon President Frederic C. Rugg of the Rockland National bank, President Henry E. Bothfield of the Market Trust Co. and Gen. E. Leroy Sweetser, all of whom gave some facts about the financial situation of the present. They said it was good and they discounted the rumors which have been flying about of late.

R. C. Rueschaw, general sales manager of the Reo Motor Car Co., then told of the policy of the company, and why it was successful. He said there was no shut down of the plant except for a week at Christmas to take inventory.

L. M. C. TRUCK BUILT FOR ROUGH GOING

The L. M. C. 2½-ton truck, manufactured by the Louisiana Motor Car Co., Inc., Shreveport, La., was built primarily to cope with undeveloped southern roads, its ruggedness being intensified for that reason.

An assembled truck, the units having been selected from the best obtainable and only those have been employed which have demonstrated their capability of hauling loads over roughest roads of the South without flinching. The units used in many cases are larger than what is required under the S. A. E. rating and their use in this truck have a tendency to make the vehicle unusually sturdy. The frame is a heavy six-inch channel steel member, amply reinforced with heavy cross members hot riveted to the side members.

The wheelbase of the truck is longer than that of most 2½-ton jobs, being fully 20 inches longer, or a total of 164 inches, while the wheels are equipped with 14 spokes instead of 12, as is the usual practise. The transmission is mounted amidship and is fitted with four speeds forward and one reverse of the selective type. The cooling system is unusually large and the fact is cited that the company has never known of an instance where one of the trucks of their manufacture has overheated in transportation work. A large finned tube radiator of Long manufacture, backed by an 18-inch fan, and extra wide belt, thoroughly cool the water of the radiator and jackets, while a shaft driven centrifugal water pump circulates the water.

The propeller shafts and universal joints are unusually large and of a type frequently used in three-ton jobs.

A Russel internal gear rear axle with its highly efficient driving principle, is used. It is fitted with Bower bearings.

The power plant consists of a Continental Red Seal engine of the four-cylinder, four-cycle, L-head type, having a bore of 4¼ inches and stroke of 5¼ inches, developing under the S. A. E. rating 29 horsepower at 1000 feet of piston travel per minute. The engine is equipped with Bosch high-tension magneto and impulse starter, Stromberg carburetor, Pierce governor and Stewart vacuum gasoline feed.

The engine gives 35 horsepower at nor-

mal engine speed. The crankshaft is fitted with three journals and the bearings are bronze shells, babbitt lined. The engine is mounted on three-point suspension, a single point at the front and two points at the rear, cast arms on the sides of the flywheel housing providing the means of fastening the engine to the truck frame.

The chassis weight is given as 4500 pounds, body allowance 1200 pounds, and the pay load carrying capacity as 5000 pounds. The wheelbase is 164 inches, the tread 56 inches front and 59 inches rear.

The tires are solids front and rear, 36x4 inch singles front and 36x4 inch duals rear, using Goodyear tires.

Hotchkiss drive is used through special springs which have been designed to give the best results. The springs are semi-elliptic, front and rear, constructed of special alloy vanadium steel. The front springs are 42 inches long and 2½ inches wide, tilted to cushion against shock. The rear springs are 56 inches long and three inches wide and all spring shackles are bushed with bronze.

The standard equipment includes integral bumper, oil gauge, driver's seat, horn, two oil side lights, oil tail light, truck jack and complete set of tools.

THREE ARTISTS TIED FOR CLARK EQUIPMENT \$1000 PRIZE

James Cady Ewell, Jonas Lie and Maxfield Parris divide the honors and the \$1000 capital prize in the national competition for the best painting portraying "The Spirit of Transportation," according to announcement made at the Detroit Athletic club, where the paintings were on exhibit during the Detroit Automobile Show.

The result of the competition was announced by Eugene B. Clark, president of the Clark Equipment Co., Buchanan, Mich., who arranged the unique contest as a tribute to the entire automotive industry.

"The Jury of Award," said Mr. Clark, "has given careful and conscientious consideration to the work of each artist. Much merit was found in each painting

submitted and as the jury was unable to reach an unanimous decision they have thought it best to divide the honors and capital prize among the artists tied for first place, who are James Cady Ewell, Jonas Lie and Maxfield Parrish.

The jury of award consisted of Judge Elbert H. Gary, chairman United States Steel Corporation; Robert W. De Forest, president Metropolitan Museum of Art; Charles L. Hutchinson, president Art Institute of Chicago; W. C. Durant, president Durant Motors Corporation; Homer L. Ferguson, president Newport News Shipbuilding and Dry Dock Co., and Frederick D. Underwood, president Erie Railroad company.

These paintings were displayed in the lobby of the Hotel Commodore during the New York Automobile Show, at the Chicago Art Institute in February, the Boston Automobile Show, the Detroit Automobile Show and are now on the Pacific coast for exhibit at the Seattle and other coast shows.

BOOM THIS YEAR IN GOOD ROADS CONSTRUCTION.

Five parallel transcontinental highways—duplicates of the Lincoln Highway—would represent the highway construction completed in the various states during 1920.

Approximately 20,000 miles of new improved roads were finished, according to reports sent in to the travel and transport bureau of the B. F. Goodrich Rubber Co. Estimates from state highway engineers say that half again and possibly double this mileage will be completed during 1921.

Nebraska Texas and Minnesota were among the leaders in total mileage of new construction. Nebraska built 1307.5 miles; Texas, 976.59, and Minnesota, 911.06. Nearly every state reports mileage under construction almost equal to the total actually finished.

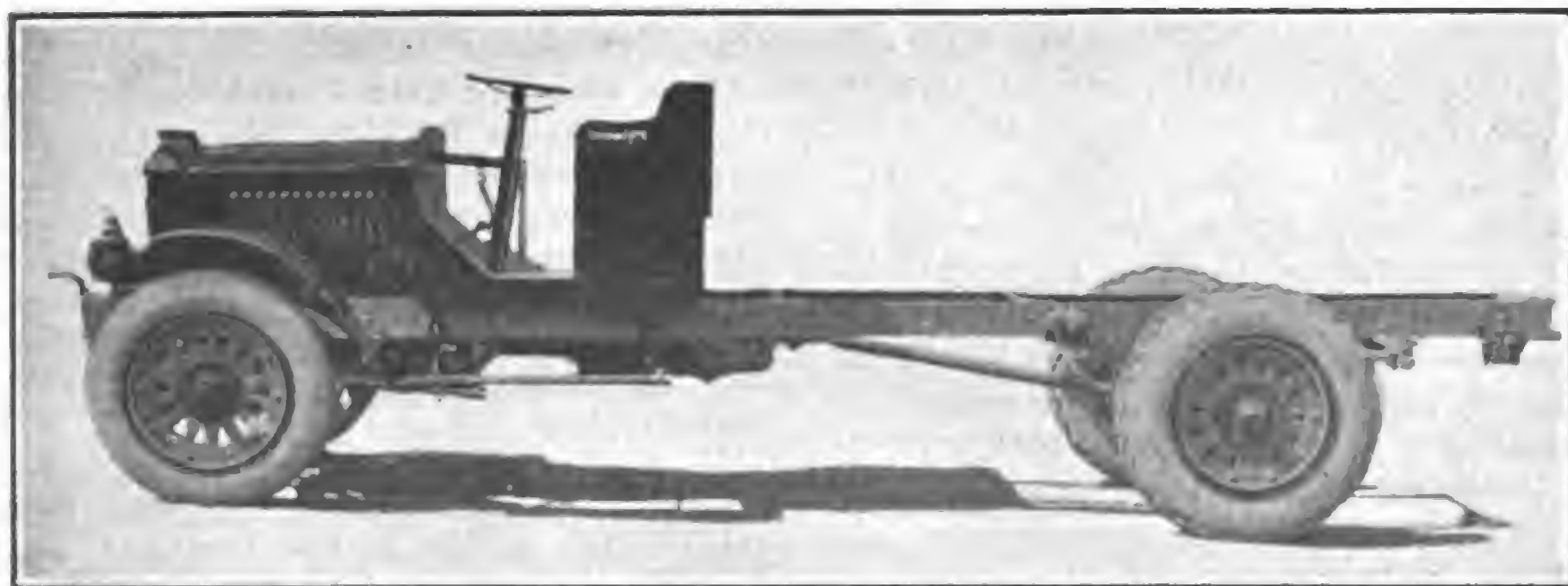
Nineteen hundred and twenty-one is to be the greatest road building year in the history of the country. Handicaps such as scarce and high priced materials and labor shortages will be absent this year. A mild winter which tended to lessen the destruction of roads and an early spring are favorable to the road building programme for 1921.

With more than \$1,000,000,000 now available in state and federal money for highway work the good roads situation is more favorable than ever before in history.

FISK ON FULL SCHEDULE.

The Fisk Rubber Co., Chicopee Falls, Mass., has been on a full time schedule of operations since the middle of March. A 10 per cent. reduction in wages has been made.

Since the beginning of the industrial depression the big Fisk plant has been running on a three-day-a-week schedule with a greatly reduced number of operatives.



Side View of L. M. C. 2½-Ton Truck, Showing Sturdily Built Construction to Cope with Rough Roads of South.

HOT WEATHER CARE OF THE TRUCK

TO KEEP the truck in trim during the heated season it is first of all necessary to understand the cooling system. Do not expect the truck to labor in low gear up long grades or through deep sand, perhaps with a trailer, and still keep cool if carbon deposit is permitted to accumulate in the cylinders, if insufficient water is put in the radiator, if the oil level is low or the oil of the wrong kind.

At the beginning of the season it is ordinarily necessary to change the carburetor adjustment, that in summer being a trifle leaner than for winter. Overheating is sure to result if the carburetor is improperly adjusted.

Timing has an important bearing on cooling. In hot climates where temperatures are excessive for considerable part of the year, the engines may be made to run cooler, but at a slight sacrifice of power, by setting the camshaft one tooth ahead (earlier) on the timing gears, so that the exhaust valve opens earlier. A weak spark has the same effect as late spark timing, and overheating will result.

Difficult grades may be made with greater speed and less fuel in intermediate than if the engine is permitted to labor in high to the point of stalling. Contrary to popular supposition the engine will cool better if it is not allowed to labor excessively.

Keep the exhaust clear of obstructions and do not allow mud to cake on the outside of the muffler or to clog the outlet.

The radiator must be filled to the top and do not allow the overflow pipe to become clogged, or flattened by a blow or kink, or to slip down into the radiator.

Use only the best quality of rubber hose for water connections. The inside of cheap rubber hose is apt to dissolve and the rubber particles will clog the system. Examine the hose connections carefully during the spring overhaul because some of the anti-freeze solutions have a deleterious effect upon the rubber. They also leave a scum inside the radiator which will not dissipate the heat. This must be cleaned out. Possibly the best method is to use common washing soda, dissolved in hot water, draining out the water that is in the radiator and filling with the solution. Drive the vehicle for a day, drain out the solution, rinse out with clean water two or three times and fill with clean water. This method will remove the scum, rust and sediment of the cooling system without the necessity of taking the system apart.

In filling the radiator only clean water should be used. Strain the water through a cloth where dirty water only is available. Above all do not use buckets in which oil has been kept.

Keep the fan adjusted so that it will

turn free without lost motion and keep it well lubricated.

Not all of the cooling of the engine is effected by water, but lubricating oil plays an important part, as it cools the bearings. Keep the crank case clean. It cools the oil. It has been found that gasoline washes the lubricant from the cylinder walls and a mixture of gasoline and oil runs into the crank case, where in time it destroys the lubricating qualities of the oil. For this reason the oil in the crank case should be drained and replaced with new oil every 1500 miles. If this is not done the oil will be unable to properly lubricate the rubbing surfaces of the bearings and heating will result.

The average working temperature of oil in summer is higher than in winter, and so oil of the same body will be thinner. Sometimes it is advisable to use a grade of heavier oil in summer. During excessively hot spells an especially heavy grade of oil may be required to maintain the oil at the proper consistency in operation. When a heavy oil is used care should be taken not to work the engine too hard before it is warmed up, thus giving the oil a chance to thin. Buy oil only from reliable dealers and buy nothing but the best as it is cheaper to buy a high grade oil than it is to pay repair bills. One experience with the wrong kind will prove this conclusively.

GOOD BUSINESS LOOKED FOR IN EAST AND MIDDLE WEST

The chart showing the status of business throughout the United States, on which manufacturers are basing their sales plans for the coming season, presents conditions as favorable in New England, Wisconsin, Illinois, Indiana, Michigan, Ohio, West Virginia, New York, New Jersey and Pennsylvania. On the other hand, little business is expected from the South this year by any of the important manufacturers of motor vehicles. As compiled by various companies the national chart reads as follows:

Conditions.

Good	Fair	Poor
N. England	Florida	Texas
Wisconsin	Maryland	Arizona
Illinois	California	Montana
Indiana	Washington	Tennessee
Michigan	Oregon	Arkansas
Ohio	Nevada	Virginia
W. Virginia	Colorado	N. Carolina
New York	Nebraska	S. Carolina
New Jersey	Kansas	Georgia
Pennsylvania	Oklahoma	Alabama
	Minnesota	Mississippi
	Iowa	Louisiana
	Missouri	Idaho
	Delaware	N. Mexico
	S. Dakota	Wyoming
		N. Dakota
		Utah

California, tabulated as "fair," and Texas classified as "poor," are both im-

portant users of motor cars when conditions are normal, and accordingly it is gratifying to note that business conditions in both of these states have lately shown distinct improvement. On the other hand, it is equally interesting to observe that the states listed as "good" are the ones which show the heaviest motor car registrations—New York and Ohio leading the country with more than 600,000 cars, Pennsylvania occupying third position with 570,000, Illinois holding fourth place with about the same number. Normal replacement needs of these states would be 500,000 units.

BIG MARKET IN MEXICO.

Jacques E. Blevins, president of Southern Motors Manufacturing Association, Ltd., of Houston, Tex., found in Mexico a broad field for American made automobiles, motor trucks and for all motor driven vehicles. Mr. Blevins says that this field is unlimited. He found that Guadalajara, with a population of 180,000, needed hundreds and hundreds of motor trucks, and thousands of passenger cars, as there is but one motor vehicle for every 300 inhabitants of this prosperous district.

Packard truck
in which sleeping
quarters above the
driver's seat elim-
inates delays on
long distance
hauls.



TWO-YARD SUB-GRADE TRUCK FOR ROAD CONTRACTORS

THE Titan Truck Co., 25th and St. Paul avenue, Milwaukee, Wis., is in production with a two-yard sub-grade truck, which has been especially designed for the use of road building engineers, contractors and general industrial purposes.

The construction of the truck includes many special features which have been adopted by the company after an exhaustive study by its engineers as to what is required in a truck of this nature. The trucks have been successfully tried out in an experimental way during the 1920 season, and wherever shown or worked have invariably demonstrated to contractors and road engineers that great savings could be made both in time of handling material, cost in operation and the number of men required for the job.

In paving contract work this special Titan two yard sub-grade truck has established records on large highway construction. Startling hauls have been

The truck is equipped with a four-speed Cotta constant mesh transmission gearset and the total gear reduction on high is eight to one, while on low the reduction is 44 to one, which gives unlimited power to the truck when pulling out of pits, soft ground or other difficult locations.

Titan-Clark Axle.

The rear axle is a Titan-Clark internal gear drive type, which is fitted with a solid load carrying member. The wheels are equipped with pneumatic cord tires, 36 by six inches front and 42 by nine inches rear. The frame is of pressed steel six inches deep, and the springs semi-elliptic front and rear, the front springs being 46 inches long and the rear springs 54 inches.

The wheelbase of the truck is 128 inches and the track of the wheels front and rear is 58 inches, and the road clearance under rear axle 18 inches.

The speed of the Titan sub-grade

f. o. b. Milwaukee, in priming coat, is \$4550.

The Titan Truck Co. states that accurate data collected from a number of contractors show that the Titan two-yard sub-grade truck cost per yard of material transported is less than 40 per cent. that of light overloaded one-ton trucks. Also that 50 per cent. less equipment and 50 per cent. less operators are required. These trucks also did less injury to the sub-grade, proved more reliable and afforded a higher speed of operation and two Titans were able to do the work of five one-ton trucks.

The Reason of the Two-Yard Capacity Truck.

All mixers today on highway construction are capable of taking a full yard mix and the two-yard truck carrying double the load, requires only half the equipment and number of operators of smaller capacity trucks. Any heavier unit would



Left: Titan Two-Yard Sub-Grade Truck Loading Crushed Stone; Right, Unloading Cement to Elevated Platform Adjoining the Mixer.

made in the transportation of aggregate, either wet or dry mix, for all distances of 1000 feet up to five miles and over.

The experiments carried out during the year 1920 showed the feasibility of truck hauling over the sub-grade. Small truck units carrying one batch mixes and mounted on pneumatic tires were used on many jobs. Pneumatic tires immediately increased the tire area on sub-grade, lessening the pressure, and at the same time affording the necessary traction. However, the inefficiency and high operating cost of the small unit and overloaded machines was quickly disclosed. The capacity of the mixers and cranes and other machinery demanded transportation equipment of equal size and load and unfailing reliability.

Chassis Specifications.

The two-yard Titan consists of a heavy constructed truck unit, amply powered with a 40 horsepower Buda engine of the four-cylinder, four-cycle, L-head type, fitted with pressure oiling system and having a bore and stroke of $4\frac{1}{4} \times 5\frac{1}{2}$ inches.

truck is 25 miles an hour on high and five miles an hour on reverse.

Body and Hoist.

The body is of steel construction throughout, made in two compartments, having a total capacity of 54 cubic feet. The division gate can be detached if desired, making the entire body clear for carrying bulky material. The body measures $8\frac{1}{2}$ feet in length inside by five feet in width, and is fitted with a double-acting tail gate. When lowered the body has an open deck length of 10 feet, suitable for hauling steel, expansion felt, lumber or machinery. The height of the side is 20 inches.

The hydraulic hoist is located underneath the body and has a dumping angle of 45 degrees. If desired by the purchaser the truck may be equipped with Titan patented positive type mechanical hoist, which has a guaranteed dumping angle of 55 degrees.

The price of the Titan sub-grade truck, including body, hoist and pneumatic tires and full equipment of tools, jack, electric lights, battery, generator and war tax.

make operation on the sub-grade difficult and result in a waste of time when discharging into the mixer.

For this reason the Titan Co. has standardized on a two-yard capacity truck having a two-compartment body. In the two-compartment body the skip holding the second batch allows the truck to start on its return trip.

The distribution of the load on the Titan truck and its large pneumatic tires give a pressure on the sub-grade of less than 80 pounds per square inch, as against 115 pounds on one-ton trucks or 270 pounds on five-ton trucks equipped with solid tires.

High Powered Engine and Low Gear Reduction.

To make a unit of this type practical it was found necessary to equip it with an unusually large 40-horsepower Buda engine and a special low geared four-speed Cotta gearset. By using large pneumatic tires the truck is able to maintain high road speed and traction and unless the engine is of large enough capacity to operate the truck at this ad-



Titan Sub-Grade Truck Elevated 55 Degrees with Mechanical Hoist.

vanced speed—it being recognized that fully 35 per cent. additional power is necessary because of the increased diameter of the large tires—the equipment is going to be sluggish and slow and consequently a failure. It is claimed that it is not practical to use small engines and speed them up. Titan engines are governed at 1150 revolutions, giving a road speed of 25 miles per hour.

Cotta constant mesh transmission gear-set is used, as frequent gear changes do not effect or wear the gear teeth.

Titan equipment has been especially designed for paving work, the two compartment body being fitted with either a hydraulic hoist or a special Titan positive mechanical hoist having a dumping angle of 55 degrees, which is fully 10 per cent. higher than any type of hydraulic hoist, a feature which is very desirable when handling wet or dry mix. The lowest point of the body when fully raised with Titan mechanical hoist is 29 inches from the ground and proves of great advantage when piling stock.

Radius Rods Essential.

It was found by the company engineers that it was necessary to make sure of radius for the rear axle drive instead of through the springs as in other drives. The reason for adopting the radius rods was, that the repeated jerking of the truck 50 or 60 times a day when discharging wet or dry mix causes a very severe strain, which, if applied directly to the rear springs, would result in spring breakage and axle misalignment. Consequently radius rods were adopted and they are attached to the side members of the frame through steel brackets riveted to the frame, and provided with a hinged joint which allows a certain amount of movement of the rod, according to the amount of spring action due to the load and the axle traveling over the road.

Figures furnished by the company taken from actual working conditions, show that the operating cost is low on short haul work of within one-half mile distances and increases as the distance hauled increases.

On short hauls of one-half mile the total time for loading, running time both ways and dumping totals eight minutes. That 75 trips were made by each truck, covering 38 miles for the working day and handling 150 yards at an operating cost per truck per day of \$13.

Figures are also given covering one, two, three and four miles. The four-

mile haul consumed a total of 20 minutes for loading, driving and unloading, the total daily mileage was 120, the total trips 30, the yardage handled 60 and the cost for operating each truck \$25.

The figures of operation are made up as follows: Driver, \$5.50 per day; fixed charges, including interest, insurance and garage rent, \$1.10, and a charge of 16½ cents per mile covering depreciation, tires, repairs, gasoline and oil.

Adaptability of the Titan Two-Yard Sub-Grade Truck.

The Titan sub-grade truck was intended primarily for road paving, contracting and road building transportation work, but while the trucks have been in operation the past year various other uses for them have been found which amply prove their adaptability to other lines of transportation work.

Aside from two-yard Titan sub-grade trucks thoroughly solving the transportation of wet or dry mix over any character of sub-grade, it can be used for other purposes in road building, such as supplying the stock piles on the sub-grade with sand from the pits or railroad siding, the carrying capacity of 5000 to 6000 pounds and the extra speed enabling them to compete economically with larger trucks.

In the hauling of supplies, expansion felt, machinery, lumber from nearby towns covering distances up to 15 and 20 miles, the special body equipment and speed permits their economical use.

Their ability to successfully compete with larger trucks in grading work or resurfacing of gravel roads enables them to be used with profit. Their use in these fields can be taken advantage of after the concrete season is over or during the season when a number of Titan sub-grade trucks can be spared because of the shortening of the haul between the base of supply, the mixer and the road.

With a little forethought Titan trucks may be kept in practically year-round operation by the contractor, as the body is so constructed and the type of the truck is such that it may be used successfully in other lines of transportation. The short wheelbase makes them especially adapted for hauling coal to in-

dustrial plants where the coal is to be delivered in the boiler rooms where the driving space is limited, allowing them to enter, leave their load and be on the road without loss of time.

GENERAL MOTORS ACCEPTANCE CORPORATION ELECTS.

At the recent annual meeting of the stockholders of the General Motors Acceptance Corporation the following directors were elected: Curtis C. Cooper, Albert L. Deane, Irene du Pont, Lamont du Pont, Pierre S. du Pont, Paul Fitzpatrick, J. Amory Haskell, John J. Raskob, John C. Schumann, Jr., and Alfred H. Swayne.

At a meeting of the new board of directors the following officers were elected: Alfred H. Swayne, chairman of the board; Curtis C. Cooper, president; John J. Schumann, Jr., vice president; Albert L. Deane, vice president; Donald M. Spaidal, vice president; James H. McMahon, vice president; Reune Martin, treasurer; George H. Bartholomew, secretary. F. Stanley Parson was reappointed auditor and Livingston Short was appointed counsel.

J. Amory Haskell remains a director, but has retired as president because of pressure of other duties as vice president of the General Motors Corporation in charge of operations. Paul Fitzpatrick remains a director, but retires as vice president, having been recently elected vice president of the General Motors Export Co.

DODGE AGENCY TO NEW HOME.

Contract has been let by Henry James and Jinks McGee of Abilene, Tex., for erection of a one-story brick building which will cover 100x140 feet at corner of North Third and Walnut streets, to cost between \$35,000 and \$40,000. Building to be occupied by Perry-Newberry Motor Co., distributors of Dodge cars and trucks. New building is expected to be ready for occupancy by Aug. 1.

The Martin-Parry Corporation, York, Pa., has appointed E. J. Herrmann sales manager for the Indianapolis territory.



Dumping Two Yard Load at the Mixer. Average Unloading Time One Minute.

HURON TRUCK CO. IS IN PRODUCTION WITH TWO MODELS

Despite unusually strong financial backing the Huron Truck Co., Bad Axe, Mich., is feeling its way along and will not get into capacity production until conditions warrant such a step. Some of the best known business men of that section of Michigan are behind the project and are well able to push expansion as fast as demand requires it. The officers are: President, Fred W. Kinde; vice president, W. R. Lyons; secretary, Carl C. Henry; treasurer, Fred M. Cross.

The Huron company is just starting its first sales work and is building its organization carefully. It does not plan to produce more than 150 trucks this year, but is prepared to double that number if the call is strong enough. The present plant is small, but the company has a complete machine shop and a full set of jigs and fixtures for the machine work on all its parts.

The Huron products are the model Erie, 3000 pounds capacity, and the model Michigan, 5000 pounds capacity.

The specifications follow:

MODEL ERIE.

Capacity—3000 pounds.
Motor— $3\frac{1}{2} \times 5\frac{1}{2}$.
Ignition—Bosch magneto.
Carburetor—Zenith.
Governor—Pierce.
Radiator—Fin and tube.
Clutch—Single disc.
Transmission—Constant mesh; four speeds forward and one reverse. Ratios: First, 5.20 to 1; second, 3.68 to 1; third, 1.86 to 1; fourth, 1 to 1. Reverse, 4.66 to 1.
Drive—Through two piece drive shaft with center bearing. Final drive through radius rods.
Front Axle—Drop forged I beam, nickel steel spindles.
Rear Axle—Internal gear. Ratio 7 to 1.
Springs—Semi-elliptic. Fronts, $40 \times 2\frac{1}{2}$ inch, 11 leaves; rears, 54×3 inch, 10 leaves.
Wheels—Artillery type.
Tires—Firestone cord; fronts, 35×5 ; rears, 38×7 .
Control—L. H. drive, center shift, adjustable spark.
Frame—Channel steel, five inches depth, width 33 inches, length rear of seat $121\frac{1}{4}$ inches; total, 18 feet.
Wheelbase—144 inches; tread, 56 inches.
Gas Tank—Under seat.
Lubrication—Alemite, gun.
Equipment—Oil lamps side and rear, front fenders, hand horn or whistle, jack, tool kit, hub odometer, Kellogg air pump.

heavy front bumper and radiator guard, Detroit weatherproof cab top.

MODEL MICHIGAN.

Capacity—5000 pounds.
Motor— $4\frac{1}{2} \times 5\frac{1}{2}$.
Ignition—Bosch magneto.
Carburetor—Zenith.
Governor—Pierce.
Radiator—Fin and tube.
Clutch—Single disc.
Transmission—Constant mesh; four speeds forward and one reverse. Ratios: First, 5.20 to 1; second, 3.68 to 1; third, 1.86 to 1; fourth, 1 to 1. Reverse, 4.66 to 1.
Drive—Through two piece drive shaft with center bearing. Final drive through radius rods.
Front Axle—Drop forged I beam, nickel steel spindles.
Rear Axle—Internal gear, ratio 8 to 1.
Springs—Semi-elliptic. Fronts, $40 \times 2\frac{1}{2}$, 11 leaves; rears, 54×3 , 13 leaves.
Wheels—Artillery type.
Tires—Firestone cord. Fronts, 36×6 ; rears, 40×8 .
Control—L. H. drive, center shift adjustable spark.
Frame—Channel steel, six inches depth, width 33 inches, length rear of driver's seat 145 inches; total, 20 feet.
Wheelbase—156 inches; tread, 58 inches.
Gas Tank—Under seat.
Lubrication—Alemite, gun.
Equipment—Oil lamps side and rear, front fenders, hand horn or whistle, jack, tool kit, hub odometer, Kellogg air pump, heavy front bumper and radiator guard, Detroit weatherproof cab top.

EXTRAS AND CHANGES.

The company can furnish stripped chassis, on hard or pneumatic tires, electric lighting or starting equipment, commercial bodies, power hoists and dump bodies, in fact any such standard equipment.

BARS UP ON HEAVY TRUCKS.

The state highway commissioner of New Hampshire on March 18 issued orders barring all motor trucks of more than three tons gross weight from the trunk line across the state and from state aid highways from March 21 until further notice.

Commissioner Everett says the purpose of this order is to protect the highways of the state during the frost season and that it will be withdrawn as soon as conditions permit.

Truck dealers who exhibited at the Bethlehem, Pa., show last month, report sales and prospects and a general upward turn of business.

PUT TEN BILLION WAR LOAN INTO FEDERAL HIGHWAY FUND

At the convention of the Southern Commercial Congress in Washington, D. C., during inauguration week an address was delivered by Dr. S. M. Johnson dealing with the highway situation, in which he proposed that Congress set aside the whole of the \$10,000,000,000 loaned to the Allies as a federal highway fund. Give the nations all the time they need in which to pay the principal, upon condition that they keep up the interest payments is his idea. Take this money and use it, half to build and maintain the national highways, half to aid the states to finish the state systems when of proper mileage.

As a result of the hearty approval given by the delegates, who represented all of the 16 southern states, the following resolutions were adopted:

1. That, in view of the deplorable condition of the highways of the United States as compared with the highways of the allied nations, constituting a condition of national insecurity and a handicap in competing for the markets of the world, due to excessive cost of transportation; we respectfully memorialize Congress to set aside the whole of the war loans to the Allies as a national highway fund, to be used as follows:

(a) For the construction and maintenance entirely at federal expense of a system of national highways to perform a service for the national security, unity, development and welfare similar to that of the national routes overseas.

(b) For assisting the several states to hasten the completion of state highway systems of proper mileage.

2. That we favor action by Congress transferring to the states, without charge, all remaining surplus war property which may be useful in any way to the state and county highway departments in the construction and maintenance of highways.

NASH BOSTON DINNER.

New England Nash dealers were the guests of C. P. Rockwell, distributor of Nash and Lafayette cars, at dinner during the Boston show.

When Mr. Rockwell, as toastmaster, welcomed his guests he was cheered to the echo, but when he introduced as the principal speaker of the evening Charles B. Voorhis, vice president and general sales manager of the Nash organization, the enthusiasm knew no bounds.

"We have come to the time when our individual organizations must be more closely unified," said Mr. Voorhis.

We must develop a stronger feeling of mutual interest. I do not believe that dealer organizations attach sufficient importance to the part they play in this greatest of industries. The Nash policy is to cooperate with dealer and not force cars on him."



White Five-Ton Trucks, Part of a Fleet of 212, Climbing Fort George Hill with Ashes in Pre-Acceptance Test for the Street Cleaning Department of the City of New York.

REDESIGNED STANDARD FIVE-TON TRUCK

THE Standard Motor Truck Co., Detroit, Mich., announces important improvements in its five-ton truck for the 1921 season. It will be produced in large quantities, with the new features incorporated, making the truck better fitted than ever for the heavy work demanded of these units by contractors, road graders and builders.

The new truck is designed to meet the great demand created by contractors for a truck with ample power and traction to pull peak loads out of excavation jobs, and to negotiate all kinds of roads in highway construction work.

The new 5-K Standard truck is splendidly powered for this class of work by a newly designed, low speed, heavy duty Continental B-2 engine, which gives this truck under the S. A. E. rating 36.1 horsepower, 48 horsepower at 1000 revolutions per minute, and 55 horsepower at 1300 revolutions per minute, as compared with 32.4 horsepower under the S. A. E. rating and 39 horsepower at 1000 revolutions per minute in the former model.

The crankshaft journal bearings in the new model are proportionately larger. In the former model the front bearing was 2 13/16 inches by three inches. In the new model it is 2 3/8 inches by three inches. The center bearing was 2 7/32 inches by 3 1/4 inches, and is now 2 1/2 inches by four inches, and the rear bearing, which was 2 1/4 inches by 4 15/16 inches, is now 2 1/4 inches by four inches. The pistons in the new engine are considerably longer, being 6 1/8 inches instead of 5 3/8 inches. The bore and stroke, which were 4 1/2 inches by 5 1/2 inches, are now 4 3/4 inches by six inches.

Some New Features.

Other additional features are the built-in governor, 1 1/2-inch carburetor instead of 1 1/4 inch; larger universal joints, provision made for installing generator for lighting system, heavier frame and longer wheel base. The wheelbase, which was 160 inches, is now 164 1/2 inches. The new Standard is 600 pounds heavier than the old model and weighs 8700 pounds.

The truck is well equipped for the work intended, the B-2 Continental Red Seal engine developing sufficient torque at the remarkably low speed of 800 revolutions per minute to provide sufficient hauling power in difficult locations.

The usual Continental construction is followed throughout in the building of the power plant, which is equipped with a Stromberg 1 1/2-inch carburetor. Gas is supplied the engine through a combined intake and exhaust manifold which dries the gas and also allows the use of low grade fuels, which proves a very desirable feature in truck operation. A flexible metal tube connects the stove fitted to the exhaust pipe with the air inlet of the carburetor supplying hot air to the carburetor and heating the gasoline slightly before it reaches the special manifold. The gasoline is vaporized quickly by this method and the possibility of unburned fuel passing by the pistons and reaching the lubricating oil in

the reservoir is largely eliminated.

An Eisemann high-tension magneto, equipped with impulse starter and manual spark control, supplies the ignition for the engine. The magneto is driven by an extension shaft from the water pump, which in turn is driven from a gear in the timing gearset.

Cooling and Lubrication.

Cooling of the engine is accomplished by means of a centrifugal water pump driven from a gear in the timing gearset, in connection with a large capacity radiator of the long vertical tube type, having cast water tanks top and bottom, which bolt to a battery of tubes called the core. Cork gaskets are used between the top and bottom pans to prevent leakage. The capacity of the cooling system is 38 quarts. A large four-bladed fan driven by belt from the engine still further facilitates the cooling of the water in the radiator and jackets.

Lubrication of the engine is supplied from the oil reservoir in the engine base and the oil is forced through cast ducts in the engine base to the main journals, camshaft bearings and connecting rod bearings, the overflow finding its way through the oil pressure regulator into the timing gearset. Oil thrown off by the connecting rods lubricates the interior parts of the engine and valve mechanism.

Standard units of proven worth are used throughout in the construction of the 5-K Standard truck, and the clutch, which is a very important item of truck construction, is the well known Brown-Lipe model 60, which is in unit with the engine and contained in the flywheel bell housing. The clutch consists of two sets of eight dry discs, alternate discs being faced with an asbestos composition friction material. Pressure is applied to the discs by heavy coil springs to compensate for wear of the plates. No adjustment of the clutch is necessary with this type of construction.

The transmission is also a Brown-Lipe model 60 and consists of four speeds selective forward and one reverse speed. The transmission is located amidship of the chassis and is supported by three-point suspension.

The propeller shafts are equipped at each end with Spicer universal joints, which are completely enclosed to prevent

dust from entering the joint and damaging it through abrasive action, and also prevents the lubricant, with which the joint is packed, from working out.

Timken Axles and Bearings.

The front axle is a Timken I beam type, fitted throughout with Timken tapered roller bearings. The rear axle is a Timken full floating worm driven axle equipped with Timken tapered roller bearings and fitted at each end of the housing with unusually large size emergency and service brakes.

The springs are semi-elliptic front and rear, made of high carbon steel, with the exception of the main plates, which are Silico-Manganese alloy. The front springs are 46 1/2 inches long and three inches wide and the rear springs 53 inches long and four inches wide.

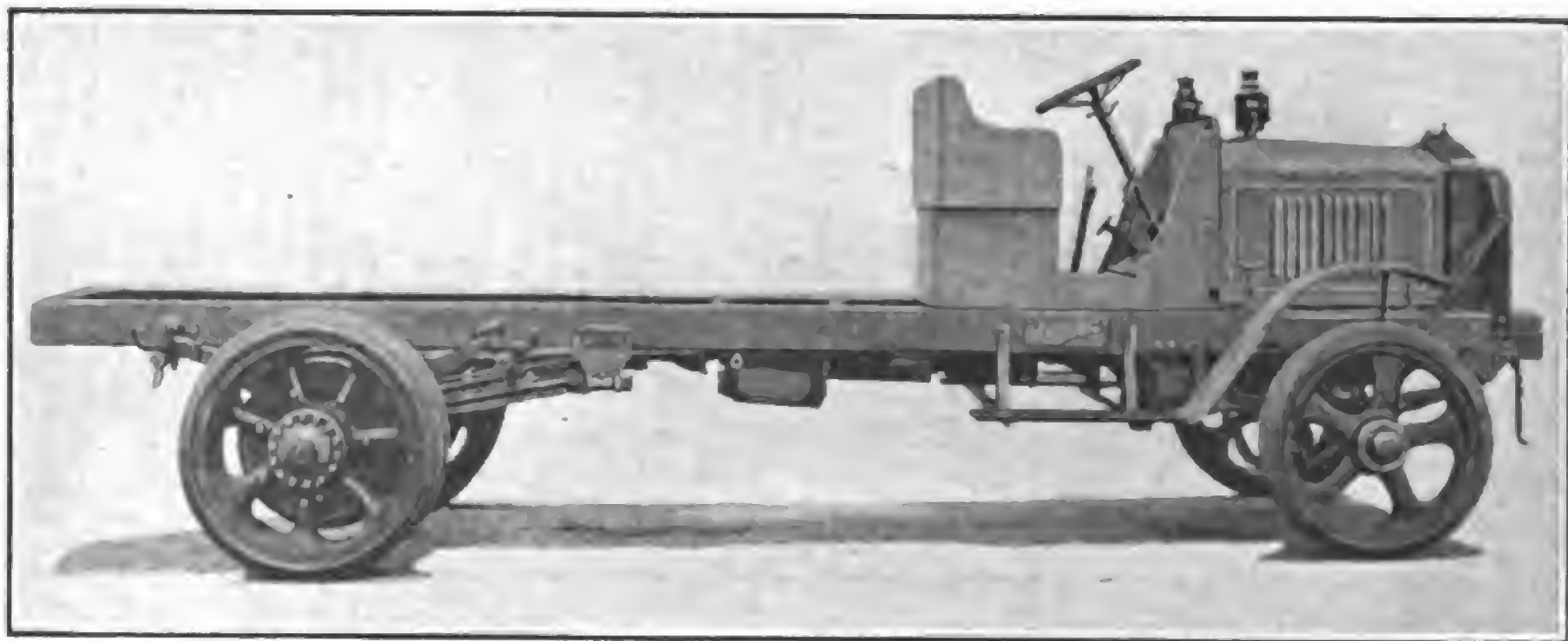
The drive thrust from the rear axle is transmitted to the chassis through radius rods of heavy I-beam section fitted with a swivel eye at the front end to relieve the twisting strain. Torque reaction from the axle is taken by the rear springs, which cushion the shock loads due to sudden starting and stopping.

The frame is pressed from steel plate 5/16 inches thick, while the side bars are of channel section 7 1/8 inches deep, and the flanges are 3 1/2 inches wide. Cross members of ample size are placed at proper distances, which provide unusual strength to the frame member. All units of the frame, including the cross members are hot riveted, thus making the construction unusually rugged.

The wheels are cast steel, made by the Dayton Steel Foundry Co., and are fitted with hollow spokes, five being used in the front wheels and seven in the rear wheels. The front wheels are equipped with 36x6-inch solid tires pressed on S. A. E. dimensions, while the rear wheels are equipped with 40x6-inch solids, dual type, pressed on.

The steering gear used in this model is a Gemmer model "R," worm and worm wheel type, located on the left hand side. The hand wheel is 20 inches in diameter and is equipped with spark and throttle levers under the wheel rim, with control levers located at driver's right hand.

The gasoline tank is located under the driver's seat and consists of a cylindrical tank holding 27 gallons of fuel. Gasoline is drawn by vacuum from this main tank



The 1921 Standard Five-Ton Model, Improved to Withstand Rougher Usage Than Ever Before. Has S. A. E. Rating of 36.1 Horsepower.

to a small vacuum tank on the front of the dash and is fed by gravity from this small tank to the carburetor.

The length of the frame back of the seat with standard wheelbase is 144 inches and for use with hydraulic or power hoist body the distance is 137 inches. When the special wheelbase truck is ordered the distance back of the seat is 180 inches.

The wheelbase of the 5-K Standard truck is 164½ inches, with an optional wheelbase special of 176½ inches. The tread of the front wheels is 68¾ inches and of the rear wheels 69½ inches from center to center of the tires.

The body weight of this truck is given at 2400 pounds for a maximum pay load of 10,000 pounds. If the body weight is less than 2400 pounds the pay load may be increased and vice versa.

Gear Ratios and Speeds with Standard Axle Reductions.

Rear axle reduction is given as 11.66 at 1100 revolutions per minute of the engine.

Transmission Reduction	Total Reduction	Road Speed
4th speed 1.00 to 1	11.66	11.3
3rd speed 1.50 to 1	17.5	7.54
2nd speed 2.84 to 1	33.3	3.96
1st speed 4.84 to 1	56.4	2.34
Reverse 5.81 to 1	67.65	1.95

The 5-K Standard motor truck may be equipped with optional axle reductions as follows: 15 1/3 to 1, 13 2/3 to 1, 10 1/4 to 1 and 8 4/5 to 1.

However, the company does not recommend that the optional axle reductions be used as ordering this installation in the truck axle at the factory is liable to delay shipment.

The chassis is sold completely equipped ready for the road, finished with one coat of priming paint, and including driver's seat, cushion and back, dash, foot boards, mud guards, bumper, radiator guard, side and tail lamps, horn, jack and complete set of tools in a tool box attached to the running board.

Price, f. o. b. Detroit, Mich., \$5250.

Lack of room denied trucks space at the Cedar Rapids, Ia., show.

RAILWAY CO. CUTS OPERATING COSTS 25 PER CENT. WITH TRUCKS

Boston Elevated Railway Co., Boston, Mass., during 1920, made a substantial progress in replacing horses with motor trucks. The change was made in the interest of economy and efficiency. It is interesting to note that with motor trucks this company has reduced the number of men in the wire emergency service from 51 to 44.

When the Boston Railway Co. adopted the motor truck it disposed of a large number of horse drawn vehicles; sold 45 horses and abandoned four stables, all of which were previously in continuous service.

The cost of motor equipment displacing the horse was \$138,000, made up of the following units: Five five-ton dump trucks; three 3½-ton wrecking trucks; two 3½-ton platform trucks; one 3½-ton wire department truck; nine two-ton tower trucks; two two-ton platform trucks; two two-ton covered express trucks; one two-ton army body truck; four ¾-ton express trucks; three ¾-ton switch repair trucks having a combined capacity of 79½ tons.

A fleet of trucks of such proportions called for extensive housing facilities which represented an expenditure of \$198,000.

In addition to economy in the handling of supplies, the most important feature is the time saved in handling wire breaks or wrecks which interfere with the operation of the cars. These emergency trucks are so located that the entire system can be easily protected and the proper truck landed at the location of the trouble with a minimum of delay.

Through the use of motor equipment the company has made an approximate saving of \$85,000 a year in maintenance expenses, which is equivalent to about 25 per cent. on its investment in motor equipment and garaging facilities after the displacement of horses.

MACK 1920 EARNINGS NET \$5.32 PER SHARE ON COMMON.

The International Motor Co.'s annual report for 1920 shows gross sales of \$34,071,365 and net profits of \$4,583,151 before write-off for inventory depreciation. After inventory shrinkage and tax reserves the profit available for the stock is \$2,644,013, equal to \$5.32 per share on the common stock after allowing for the preferred dividends. There are 283,000 shares of common stock outstanding.

The report shows that at the close of 1920 the corporation had net quick assets of \$19,174,196, compared with \$12,654,875 at the end of 1919. Since the close of the 1918 fiscal year net quick assets have increased \$11,638,978, or 154 per cent.

During 1920 the company delivered a total of 7020 trucks, an increase of 54 per cent. compared with the previous year. Its plants are now developed to a point where they could sustain an output of 9000 to 10,000 trucks per annum. While the outlook is for a period of moderate earnings during the first half of 1921, officials of the International Motor Truck are confident of a decided revival in earnings during the second half.

SOUTHERN MOTORS BUSY IN THIS COUNTRY AND MEXICO.

Southern Motors Manufacturing Association, Ltd., of Houston, Tex., with 100 acres of land along the ship channel, giving access by boat to every country of the world and to every shore of the United States, not only receives its material by water route from makers whose plants are near the seaboard, but ships its finished product to the world markets by boat. Mexico, a country in which under reconstruction, the automotive business is growing rapidly, is right at the doors of Southern Motors, which is already doing a nice business there.

The thought, ever uppermost, that automobiles, motor trucks, tractors and trailers may only be made in the automotive centers in Michigan, Ohio, Indiana or Chicago, is proven a misnomer by Southern Motors. The president of this organization, Jacques T. Blevins, had foresight when, more than three years ago, he removed the company from Dallas to Houston to take advantage of the shipping resources of the city.

The company's product bears the typically Texan name of Ranger, carried by the passenger cars, trucks, tractors and trailers made by Southern Motors.

AMERICAN TRUCKS IN SWEDEN.

The following American trucks are handled by Swedish dealers: Atterbury, Autocar, Chevrolet, Clydesdale, Corbitt, Diamond T, Duplex, Federal, Ford, F. W. D., Garford, Giant, GMC., International, Kissel, Lansden electric, Maxwell, Nash, Paige, Reo, Republic, Selden, Sterling, Traffic, U. S., White and Wichita. American trucks are going strong in Sweden despite temporary handicap.



The Cyclone Starter & Truck Co., Greenville, S. C., Has the Right Idea, Which Is to Exploit the Home Market First. Cut Shows a Cyclone Model A 1½-Ton Truck in the Service of the City of Greenville. The Picture Exemplifies What a Simple Matter It Is in the South to Supplement Horsepower with Man Power.

SPECIAL TRUCKS FITTED WITH DUMP BODIES SPEED ROAD BUILDING

The spring and summer of 1921 will find many road building contracts under way. In nearly every state in the Union the good roads movement is daily receiving fresh impetus. This cause is getting strong indorsement from the farmers throughout the country, as the farming element is making heavy purchases of power machinery and necessarily require the best of roads to transport their products from farm to market. Nearly every farm of consequence has a family passenger car, and the farmers have come to appreciate good roads as well as their city cousins, who find in the country ideal spots for travel and relief from their work in the city.

Road building contractors and paving commissioners will find in the new Contractors Special truck, manufactured by the Diamond "T" Motor Car Co., 4517 West 26th street, Chicago, Ill., a solution of their hauling problems. The new truck has been designed to offer quick, economical methods of transporting road building materials and actual tests are said to show a saving of 25 to 50 per cent. over the older conventional method of distributing sand, gravel, crushed rock and cement, where the equipment used varied from one to five-ton units.

The new truck is equipped with dual end dump hoppers constructed of No. 10 gauge steel throughout, each compartment having a capacity of one cubic yard, giving a total load capacity of 5000 to 6000 pounds. The exceptionally short wheelbase enables it to turn easily on an 18-foot sub-grade. Pneumatic cord tires are fitted, front and rear, the front wheel sizes being 34x5 inches and the rear wheels, 40x8 inches, which allows operation over soft ground and particularly protects sub-grades from being broken down.

The construction design is unusually sturdy, compact and rigid. Auxiliary springs carried on each frame member and resting on spring box prevents spring rebound and relieves side sway when only one hopper is filled. A coil spring connects the hopper control chain with the forward frame member, absorbing the dumping shock.

Amplly Powered by Heavy Duty Engine.

The engine is a heavy duty Hinkley truck motor, four-cylinder, four-cycle, L-head type, fitted with detachable head.

The bore of the engine is four inches and the stroke 5¼ inches, developing 43 horsepower at normal engine speed. The carburetor is equipped with air strainer to prevent the entrance of dust to the combustion chambers and the possible scoring of the cylinders and pistons.

Two Loads at Once.

The steel hoppers are mounted side by side on a special steel frame back of the driver's seat and directly over the rear axle. This type of construction allows for separate dumping of the hoppers and transporting, if necessary, two grades of material or batches.

This truck, besides being used as a

construction unit, has also been found especially useful in road maintenance and repair, the dual hoppers permitting distribution of the load at several repair points.

This equipment created great interest at the Good Roads Show at Chicago and is indicative of the important part units of this type will play in the 1921 road building programme.

R. F. Conway of Chicago, Ill., has purchased 10 Diamond "T" Contractors Special trucks for spring delivery. The Conway company tested out this truck on a strip of road near Morris, Ill., last fall, and the unit which was exhibited by the Diamond "T" Co. at the recent Good Roads Show was the identical truck which was used in that demonstration.

OVERLOADING AND SPEEDING OF TRUCKS DECRIED BY MERCHANTS

The Merchants' association of New York city has adopted resolutions condemning the overloading of motor trucks and their operation at excessive rates of speed on public highways.

This action was taken upon the recommendation of the association's special committee on highway development. In its report the committee said in part:

"It is quite certain there will be no diminution in the use of heavy motor trucks as a facility of transportation. On the contrary, the use of that type of vehicle on the highways outside of cities will undoubtedly increase. Even when these heavy motor trucks with ordinary loads are operated by careful and skilled drivers and at moderate rates of speed the wear and tear on road surfaces is considerable, and when overloaded and driven at a high rate of speed they are a menace to other traffic, besides causing great damage, and in many instances ac-

tual destruction to our highways.

"If our highways are to perform most efficiently their economic function and the development of the motor truck as a permanent essential and economical facility of transportation assured, these practises and abuses must be corrected without delay.

"Largely because of the abuses referred to there has recently developed in legislative bodies a considerable hostility toward this type of vehicle and a disposition to enact drastic traffic laws and regulations and the imposition of excessive license fees all of which tend to retard the proper development of the use of motor trucks.

"We believe that this matter should be presented to the owners and operators of such trucks and their cooperation sought to the end that the abuses referred to may be corrected at once."

U. S. C. OF C. MEETING.

The general theme of the ninth annual meeting of the Chamber of Commerce of the United States, to be held at Atlantic City, April 27 to 29, will be: "In the public interest more business methods in government; less government management of business."

All of the questions to be brought before the meeting will be approached as they relate to the general subject. Speakers will include government officials and leading business men in many lines of finance commerce and industry.

The programme for the meeting marks a new departure for the chamber in that groups will discuss questions of a more general nature than those affecting solely the industries within the group. The purpose of this is to get the fullest and freest discussion on broad general problems that touch various phases of business differently. The group arrangement as planned gives related industries the opportunity to express their views.



Contractors' Special Truck Equipped with Two-Yard End Dump Body, Is Especially Desirable in Road Construction on Account of Its Speed and Short Wheelbase.

DUPLEX VOCATIONAL SELLING PLAN

THE Duplex Truck Co., Lansing, Mich., has developed a definite and logical selling plan, which it has detailed for dealers in an attractive booklet under the title: "Vocational Selling as Applied to the Motor Truck Industry."

This is a progressive and common sense system which is bound to be a factor in the successful merchandising of trucks. It requires two essentials in order to win results, however. First, the factory sales department must be absolutely sold on the proposition. Second, the dealer must be sold and must be kept sold. The plan is going to take a little extra time from the dealer at the start, as all new plans do. In order to get him to give this time the merit of the project and the sure rewards its carrying out will bring must be constantly pounded into him by the men behind. The only flaw in the layout is this possibility that the dealer will not do his part. It can be overcome by driving, constant driving from the factory sales department.

Frank B. Willis, sales manager, has long been an earnest disciple of vocational selling. He has tried it on a smaller scale elsewhere with abundant returns. He has seen it carried to success by other industries. He has had most to do with its adoption by the Duplex company and will fight in the front ranks for its success.

President Lee's Statement.

That President H. M. Lee is sold on the plan is best illustrated by a recent statement from him, which follows:

"No, business is not bad with us," said President Lee. "It is really quite good considering everything."

"But to even make business 'quite good' something had to be done. In other words we could not just sit idly around waiting for business to come tramp, tramp, tramping into our plant. So we devised means of diverting business into Duplex channels.

"Conditions such as we face today demand radical merchandising changes. To be sure you cannot force people to buy trucks if they do not want or need them, but there are enough progressive men in this good old U. S. A. who are buying trucks to keep quite a few plants running and the plan remained for us to intelligently go after as much of this business as we could.

"By the use of the Duplex Vocational Selling plan we have opened the eyes of a good many truck prospects, as well as some of the old skeptical hard shell dealers.

"By the proper adaptation of this Duplex Selling plan we showed them how to first—gain a prospect's confidence. Operating as we are on the Duplex Vocational Selling Method we do not start right off by boring a prospect about the mechanism of our trucks. On the contrary we talk to him about his transportation requirements. Our research department then makes a complete survey of his hauling problems. We figure out



President H. M. Lee, Duplex Truck Co., Lansing, Mich.

every item he has to contend with. Weights are considered, his local wages calculated, lengths of hauls, working hours, gasoline and oil consumption—in short every item of his individual and local requirements and expense is carefully figured out.

Truck Fits the Job.

"On this finding we recommend a given truck installation. Thus he gets a definite and individual proposition as it applies to his specific business. By the use of this plan a business operating in the oil fields cannot get a truck that logically belongs in a logging camp. No other method, in our estimation, can carry such a measure of safety, economy and efficiency to the truck user.

"Briefly that is undoubtedly why the Duplex business has held its own. January and February shipments were quite good and from all indications March has all the ear marks of being just as satisfactory."

The plan is founded on the premise



F. B. Willis, Sales Manager, Duplex Truck Co.

that good merchandise properly made and intelligently sold is a builder of permanent business. The theory of the system is that the salesman gets in close touch with his prospect at once and is enabled to talk with his man behind the desk instead of being forced to talk across the desk.

Outline of the Plan.

The chapter titles of the booklet outlining the plan give a good idea of its elements. They are: The Vocational Selling Plan, What It Means—Vocational Classification (with 21 groups)—Analyzing Territory—Relative Fields of the Four-Wheel-Drive and Limited—How the Vocational Plan Helps Find Prospects—Solicitation and Visitation of the Prospect—Sales Research Department, Its Functions—Catalogues and Their Uses—Transportation Surveys, Selecting the Right Truck—Dealer's Relation to His Salesman—Circular Letters, Direct Mailing Campaign—"Duplex Doings," How to Properly Make Use of It—Advertising—Developing Territory—Selecting Associate Dealers—Fleet Owners, Their Sales and Advantages—Keeping Operating Costs—Service.

The factory sales research department is a decidedly important cog in this machinery. The dealer forwards his newly acquired knowledge of the conditions under which the prospect operates his business and the case is thoroughly analyzed and the findings forwarded to the dealer. One of the strongest features of this selling policy is that the factory is in close contact with the dealer and backs him to the limit.

TRUCKS REPLACE MULES.

The first long distance motor truck drivers in Kentucky had to use steel cabs and bloodhounds in order to keep the busses running, according to Major Thompson Short of Lexington, Ky., who incorporated the line. The wagoners of the district banded together and ambushed the truck drivers with rifles, more than 300 shots being exchanged in a single night.

These experiences are related by Major Short in a letter to E. C. Shumard, chief engineer of the United States Motor Truck Co. of Covington, Ky.

When Major Short passed through the same neighborhood a short time ago he found eight motor trucks doing the work of the 40 old mule wagons that had formerly tried to handle the business and the drivers themselves licensed truck drivers.

TRUCK BODY CATALOGUE.

The Continental Car Co. of America, manufacturer of commercial bodies for Ford one-ton and Model T chassis, has issued an attractive catalogue for free distribution to Ford dealers. The various bodies are described and illustrated, a series of illustrations picture the various product.

DUMP BODIES FOR PACKARD CHASSIS

The Metropolitan Body Co., Inc., Bridgeport, Conn., is making ready for a prosperous season with a voluminous production of combination dump bodies which are adapted for use on Packard short wheelbase truck chassis in contracting, paving and other road construction work.

The bodies are built unusually rugged for heavy work and are constructed of wood throughout heavily reinforced with iron.

The subframe is composed of four inch I-beam longitudinal and cross members having lifting arms of three inch "T" iron hot riveted and braced to the subframe.

The platform consists of 2¼ inch oak platform frame sills, bound with ½ inch by 2¼ inch iron sill binder running entirely around the platform and bolted through the sills. The flooring is of 1¼ inch maple or oak, attached to the cross members with two-inch No. 14 screws. The flooring is covered with No. 12 gauge blue annealed steel floor covering, fastened to the floor, with 80 bolts. The platform is attached to the sub-frame with 25 bolts. Eight stake pockets are provided which give stability to the removable sides. The rear corners and tail gate mechanism is protected by heavy bumpers.

Tailgate and Sides.

The tailgate frame construction is 24 inches high and 1¾ inches thick, bound on the edges with iron and lined inside with No. 12 gauge blue annealed steel, securely riveted. The corners are reinforced with "U" shaped angle iron and two inch "T" iron. The dumping mechanism is positively automatic in action and is directly connected to the hinge block. Double acting features permit the using of the tailgate as an extension to platform for loading, and also dropping or removing of same without tools. The hinges are heavily ribbed for reinforcement purposes.

The sides are eight inches high, with 1¾ inch oak stakes and ash panels, the stakes and rail bound with iron and the inside of the panels lined with No. 12 blue annealed steel, securely riveted. Inside and outside tailboard hangers on rear stake are securely braced to the rail. The stakes and stake pockets are arranged for bolting down the sides when desired.

The bodies may be furnished with six inch or 12 inch removable sideboards or 30 inch sideboards, which are removable, and bound with iron.

The front end gate is 30 inches high, fitted with 1¾-inch oak stakes and ash panels, with the top corners bound with angle iron. The inside is lined with No. 12 gauge blue annealed steel, securely riveted. The front is permanently attached to the platform with strap bolts and heavy corner irons.

The Metropolitan body is designed to be used with hydraulic hoist and for those purchasers who prefer a wooden dumping body instead of a steel body. A feature which will appeal to many users

is that the sides and end gate may be removed in a few minutes time, making the truck available for transporting bulky or flat freight, such as lumber, steel, cotton in bales, etc.

The Metropolitan all-weather top will fit any model of Packard chassis.

THE LINCOLN HIGHWAY.

Usually the first question of the individual making inquiry concerning the condition of the Lincoln Highway is, "What is the road like today?" The answer is given in the figures just made public by the Lincoln Highway association contained in the following table:

End of 1913—Mileage, 3389; improved, 1598 miles.

End of 1918—Mileage, 3323; improved, 2161 miles.

End of 1919—Mileage, 3323; improved, 2421 miles.

End of 1920—Mileage, 3305; improved, 2853 miles.

That the Lincoln Highway association is doing wonders in the way of bringing about the actual improvement of the transcontinental route is well indicated by the following table showing improvements to date:

Classification of types of road construction on the transcontinental route, New York to San Francisco, Jan. 1, 1921.

Concrete	422.34 miles
Brick	219.68 miles
Bit. macadam.....	401.81 miles
Macadam	287.10 miles
Asphalt	78.00 miles
Creosote block.....	5.90 miles
Granite block.....	7.10 miles
Graded gravel.....	956.00 miles
Natural gravel.....	62.10 miles
Graded earth.....	725.67 miles
Natural earth.....	136.00 miles
Sand	3.30 miles

Total.....3305 miles

In seven years time a total of \$31,284,520 has been spent in the improvement of the Lincoln Highway. In 1920 alone new construction accomplished on the highway ran as follows: Concrete, 127.5 miles; brick, 7.1 miles; bituminous macadam, 12.2 miles; macadam, .5 miles; gravel, 187.8 miles; permanent earth grade, 206.9 miles; total, 542 miles.

According to present plans the Lincoln Highway association anticipates further improvement in the coming year at a cost of approximately \$10,000,000.

HEIL CO. PRICE LIST.

The Heil Co., Milwaukee, Wis., manufacturer of tanks, bodies and hoists, has published a price list of steel dump bodies and hydro hoists in which every truck dealer and distributor will be interested. The company will be glad to send a copy to all in the trade. This list is complete in every way, giving weight of body and material to be hauled, body capacities for various kind of materials, price on each particular unit, body and hoist and body and hoist together. Above each table is placed a cut to show exactly what is represented.

Inquirers as to any particular job, so that their case may be handled promptly, should forward the following data:

Wheelbase and capacity in tons of chassis, make of chassis, model No. of chassis, model of body desired, specify body accessories wanted, material to be hauled, mounted on solid or pneumatic tires, if pneumatic tires, give size; make of transmission, model No. of transmission, location of transmission, amidship or unit power plant; make of rear axle, model No. of rear axle, send blue print of chassis if available.

BRIDGEPORT IN TROUBLE.

The Bridgeport Motor Truck Co., Bridgeport, Conn., is in the hands of a receiver.



Metropolitan Combination Dump Body No. 40, 10½ Feet Long, 6½ Feet Wide, 18 Inches Deep. Sides and End Gate Easily Removed When Platform Body Is Desired.

Truck Fleet Saves \$75 a Day In Store Delivery Work

Minneapolis Firm Also Commends Dependable Service and Advertising Value—Efficiency and Economy of Motor Equipment Demonstrated in Hauling Coal, Logs, Ice, Produce, Cotton, Paper and Other Products—Fourth Article of Series on the Utility of the Truck in Transportation.

(By ED. S. BENJAMIN, Superintendent of Delivery L. C. Donaldson Co., Minneapolis.)

THE $\frac{3}{4}$ -ton GMC is the standard delivery truck of Donaldson's Glass Block Store. It won this place of merit after we had tried out several different trucks.

"In 1912 we were using 55 head of horses, mostly on single delivery rigs. We started using motor trucks that year and gradually got rid of our horses. Today we have only 17 horses left in our barns. We bought five $\frac{3}{4}$ -ton GMC trucks in November, 1918. Finding them very well adapted for our work we added others from time to time.

"At present we are using 15 of the $\frac{3}{4}$ -ton GMC's. We also use a few larger trucks for heavy hauling and some light cars for special delivery work. But the GMC is recognized by us and our customers as the regular delivery truck for Donaldson's Glass Block.

Average 45 Miles and 135 Stops Per Day.

"Our GMC's operate daily on carefully scheduled routes. One truck goes to Lake Minnetonka and back every day, making 75 miles on the round trip, including stops. Another runs 45 to 50 miles a day covering St. Paul. The other 13 make regular deliveries in Minneapolis and the immediate suburbs, averaging 45 miles.

"The average number of packages delivered by a truck is 150 a day. Some trucks deliver only 75 to 100, while others run as high as 150 to 200. Ordinarily each stop means the delivery of a single package—a piece of furniture, an order of household linen, a child's dress, etc. But as several packages may be delivered to one customer at the same

time, probably the average is 135 stops per day.

"Besides stopping so often for deliveries, the trucks are, of course, frequently delayed by traffic conditions. In order to eliminate the idling of the engine during delivery and traffic stops, we have put self-starters on all the trucks. Tests show that the GMC's are averaging 7.75 miles to each gallon of gas consumed.

Dependable Trucks Combine Service and Advertising Value.

"Traffic conditions in Minneapolis are very unfavorable to motor trucks during the winter months. The streets are level and well paved, but we have a great deal of snow and the thermometer is often 20 below zero for weeks at a time. We cover both the radiator and the hood of our GMC's to prevent freezing. The trucks have already been through two winters and we know we can depend on them regardless of weather conditions.

"All our GMC's are fitted with large van bodies, which give them ample carrying capacity, while protecting their contents. These bodies are distinctive in shape and the flat plain sides make our name show up well. As the trucks always look freshly painted and well kept, we believe they have a distinct advertising value by keeping our name before the public.

"It has always been the policy of Donaldson's to give its customers the best service possible. We should feel that we had failed to live up to this rule if we were still delivering with horses, and we are sure our customers appreciate the

prompt, quick service our GMC's are giving them.

Analysis of One Year's Operating Record and Costs.

"We adopted the $\frac{3}{4}$ -ton GMC's as our standard delivery trucks because they gave us the steadiest service and lowest cost of all makes tried. Not one of our 15 GMC's has had to have its rear axle repaired or its rear parts taken down. This seems to us a remarkable record for trucks averaging 135 stops a day. Recently the first five trucks were overhauled, but the engines were found in perfect condition and practically no repairs were necessary.

"Of course we give our trucks very good care as to both polishing and oiling. We maintain a well equipped and organized garage, and employ five men to look after our trucks. This keeps down repair bills and enables us to prevent little troubles from becoming big ones.

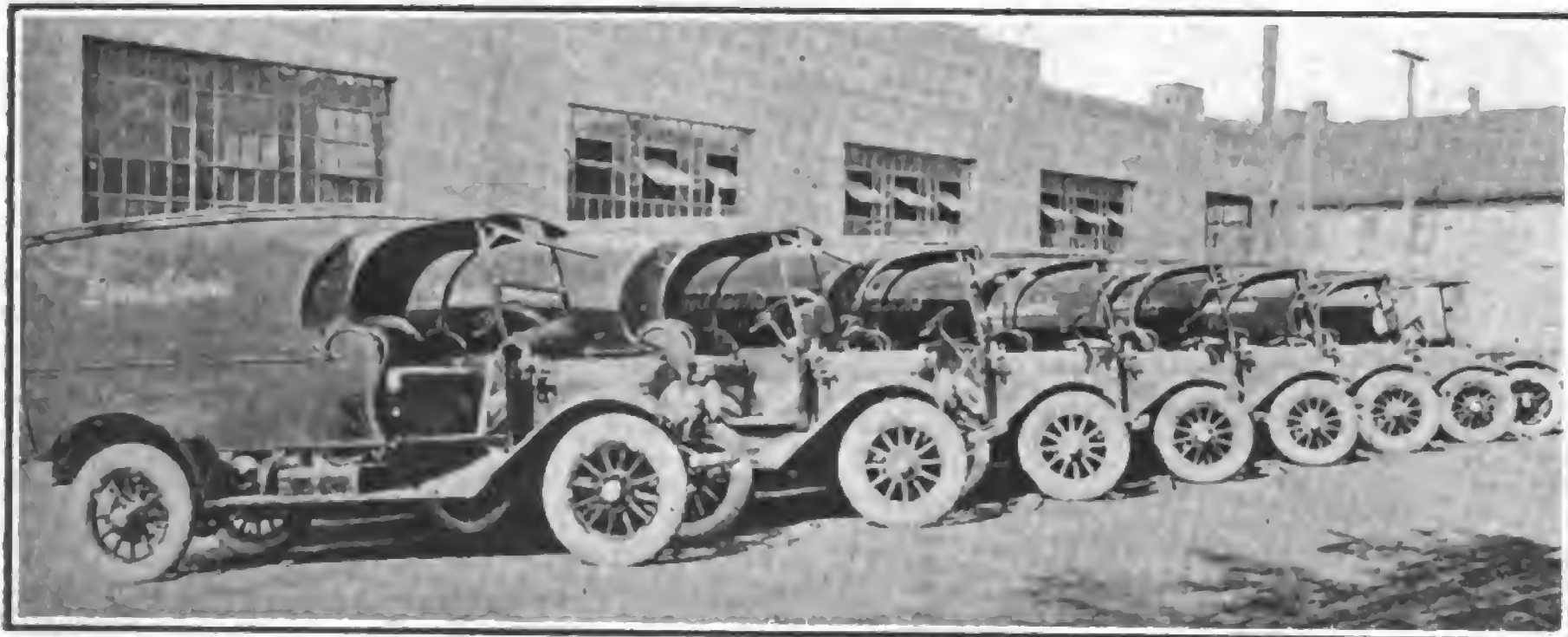
"To show how our costs run let us take one of the original GMC's purchased in November, 1918, and consider its operation for the year ending July 1, 1920. In that period it worked 290 days and travelled 13,050 miles. Its actual repairs were nothing, but we allow \$450 a year for maintenance and repair. These trucks are depreciated on the basis of 55,000 miles life.

"It costs \$12.82 a day to operate this truck, or 28.47 cents a mile. This includes driver's wages. Carrying the analysis still further, if the truck averages 135 daily stops, at each of which it delivers a single package, it is delivering at a cost of 9.49 cents per package, or .41 cents per package mile.

Big Savings on Delivery.

"It is difficult to make any definite comparison between our present delivery costs and what it would cost us with horses. Our business has increased greatly since we did away with horses, and horse costs are very much higher today.

"It is safe to say that each of the GMC's is doing the work of two single horse rigs, so it would require at least 30 wagons to replace the 15 trucks. As a wagon, with driver, would cost at least \$9 a day, each of our 15 GMC's is saving us over \$5 a day. In the course of the year this saving would amount to a considerable sum.



Part of the Fleet of 15 GMC Trucks Which Do Fine Work and Prove Highly Economical in Service of Donaldson's Glass Block Store, Minneapolis.

"In making long hauls with horses we should have to send out a big van which would distribute through several smaller wagons operating locally. At Lake Minnetonka for example, which is 17 miles away, our customers now receive today the goods purchased yesterday. If we

were delivering to such points with horses the goods would not be received until three days after purchased. And the cost of our suburban deliveries would be increased just as much as the efficiency was lowered.

"Prompt and regular delivery is an

important item in the conduct of a big department store. Our customers expect the best of delivery service from Donaldson's and we want them to have it. Our fleet of GMC's enables us to give such service at reasonable cost."

Standardizing on Quality Truck Proves Profitable

(By W. S. POWELL, Powell & Titus Coal Co., Brooklyn, N. Y.)

"Why have we standardized on Selden trucks?"

"For four very good reasons:

"First, Selden trucks are specially adapted for the heavy hauling necessary in the coal business.

"Second, their operating and repair costs are low.

"Third, standardization on a dependable truck greatly increases its efficiency.

"Fourth, the New York distributors of the Selden give splendid service.

"Our company uses motor trucks for delivering coal to our customers—mostly families and apartment houses ordering 5, 10 and 20 tons at a time. For these small deliveries it is usually necessary to unload the truck and deliver the coal in the basement.

"Horses are usually used for this type of work, and we still use 10 teams of horses for the shorter hauls and places where there is likely to be considerable delay. In spite of the short hauls and idle time we know we can make the ordinary delivery quicker and cheaper with trucks.

"We are now operating four Selden trucks, all 3½-ton capacity. Rather, that's the chassis, for they are equipped with a five-ton body and usually carry five tons per trip. Approximately 10 minutes are required to load a truck. The coal is loaded from an overhead hopper and screened as it comes from the hopper. The load is weighed and the truck is off on the job making deliveries.

"The truck bodies are equipped with both side and tail chutes. Usually the coal is let out into bags and so carried into the house. In some cases it is dumped onto the pavement. Of course the first method of delivery requires considerably more time, but the trucks average four trips a day. Sometimes they run as high as five, six and seven, depending upon the distance from yard to customer. As a matter of fact, these trucks all operate approximately the same miles per day, averaging 28 miles, and carrying five tons per trip.

"The trucks were purchased in November, 1917, February, 1918, October, 1918, and March, 1919. This consecutive purchasing shows what Selden trucks have been doing for the Powell & Titus Coal Co. and is the best comment we can make on their dependability for delivering coal.

"Our drivers also like Selden trucks. All of them make minor adjustments, supply the trucks with grease and keep them in good condition. Practically all our drivers have been with us a long

time—some having driven horses before the motor trucks were installed.

"One of the drivers is a first class mechanic and looks after ordinary repairs and maintenance. During a slack period when all four trucks are needed, he pulls in one of the trucks and goes over it thoroughly. By this system a driver is never laid off while his truck is being repaired. The company plans to have only one truck in the garage at a time.

"Though we use horses for certain jobs, we operate only Selden trucks. This standardization has several big advantages. In the first place, fewer parts are necessary and the mechanic is equally familiar with all trucks. Also if a part is broken on one truck, and a different part broken on another truck, we can change parts from one truck to another. This lays up only one truck, whereas otherwise the two trucks would be kept in.

"The Selden people give us first class service. Once a month their man comes around and inspects the trucks to see if they are in good condition, or need repairs. If we do need anything he gets it to us quickly. In every respect the Selden branch cooperates with us in keeping the trucks on the job and in good working condition.

"Our trucks average fully 280 days per year on the job. Nevertheless, the total actual repairs for all four of these trucks since they were purchased amounts to only \$650. This is certainly a very low repair cost, for the total mileage of the four trucks represents an average of two full years of operation.

"Average actual repair cost per truck, \$81.25 per year. Three and one-half-ton costs \$15.28 per day, including all items. Low mileage only 28 miles per day brings high cost per mile. With five-ton loads trucks make five miles per gallon of gas.

"Truck is used on retail delivery, necessitating considerable delays. Thus mileage is low—28 miles per day being average. Total cost is very reasonable for this delivery—\$15.28. Remember this truck carries five tons almost constantly. This means heavy depreciation, only 32,000 miles life is estimated. Even with big overload truck averages five miles per gallon of gasoline."

MOTOR TRUCK TERMINALS.

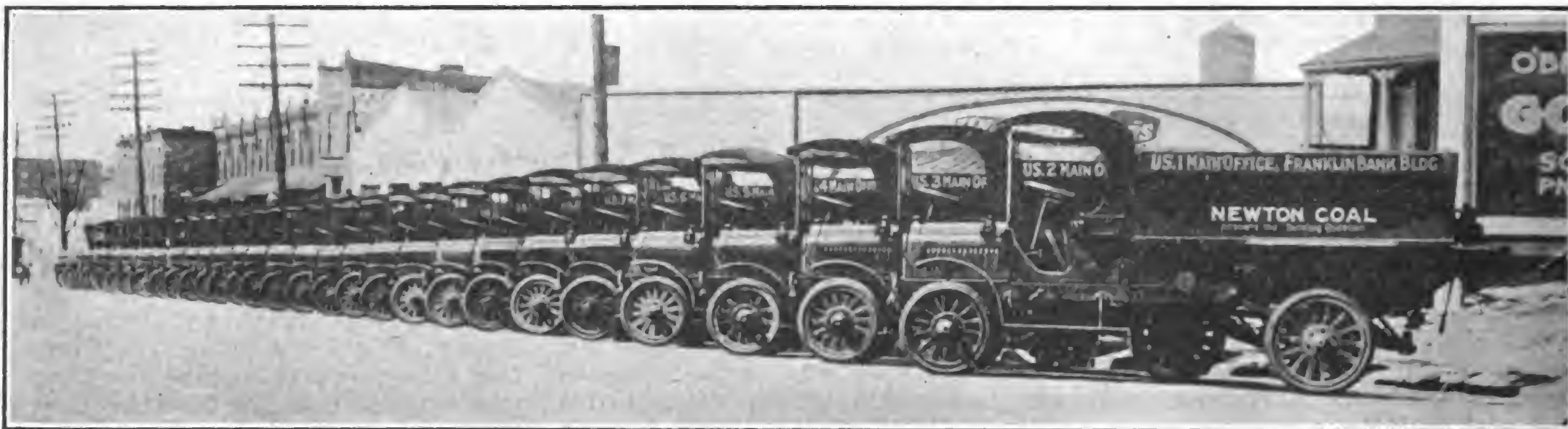
Another advance in the progress of motor transport is charted by the Firestone Ship by Truck Bureau, Akron, O., in a bulletin dealing with "The Motor Truck Terminal." This bulletin tells how to organize truck terminals, defines the length of the "short haul," cites examples of terminal operation and shows how trucking through terminals adds to the efficiency of motor transportation.

"The Motor Truck Terminal" is the seventh of a series of bulletins published by the bureau which sets forth a phase of truck efficiency, or which points out new fields for the use of trucks. Bulletin number five, "The Relation of Costs to Motor Truck Transportation," has been distributed upon request to more than 200,000 truck operators, dealers and libraries.



One of the Four Selden 3½-Ton Trucks Which Flt the Job and Are Run with Low Operating and Repair Costs by Powell & Titus Coal Co., Brooklyn, N. Y.

Big Fleet Plays Part In Building Coal Business In Which 150,000 Customers Are Served



Part of Monster Fleet of U. S. Trucks Which Works in All Kinds of Weather for Geo. B. Newton Co., Philadelphia's Largest Coal Concern.

The utility of the motor truck in the coal business is probably given no more striking demonstration than in the case of the Geo. B. Newton Coal Co., Philadelphia, Pa., which has an immense fleet of U. S. trucks delivering its product to something like 150,000 customers. The company maintains that the efficient, dependable service rendered by this motor equipment has been one of the chief reasons why its clientele is added to by tens of thousands annually. In the last four years the company has purchased nearly 100 U. S. trucks, proving its continued confidence in this motor unit for delivery purposes.

Trucks never faced greater difficulties than during the 1919-1920 winter when delivery service in many lines of industry went to smash. The storm had practically no effect on the big Newton fleet. Through snow and ice these powerful haulers, loaded to capacity, worked every

hour of every day, carrying coal instantly to relieve distress.

Not one of these trucks was stuck. Not one had to be towed in. None had gear troubles, burned bearings, broken axles or any other irregularity which might have prevented them from performing their usual prompt service.

The Geo. B. Newton Coal Co. is the largest coal company in Philadelphia and employs the most modern methods. It has made a thorough study of coal hauling problems and has decided that the U. S. motor truck, which it employs in bulk, best meets the exacting conditions and severe requirements of its trade. This statement is backed by carefully kept cost records, which show remarkably low delivery costs and unusually small service and upkeep expense.

A few record sheets taken at random show what some of its U. S. trucks performed on Feb. 5, the day after the

record snow storm of 1920. They follow:

Truck 6.
Worked.....10½ hours
Traveled.....32 miles
Delivered.....22 tons coal

Truck 26.
Worked.....10 hours
Traveled.....25 miles
Delivered.....25 tons coal

Truck 25.
Worked.....11½ hours
Traveled.....37 miles
Delivered.....18 tons coal

Truck 12.
Worked.....10 hours
Traveled.....19 miles
Delivered.....24 tons coal

Truck 5.
Worked.....10 hours
Traveled.....29 miles
Delivered.....18 tons coal

Truck 2.
Worked.....11½ hours
Traveled.....32 miles
Delivered.....22 tons coal

Pneumatic-Tired Trucks Haul Overloads Without Injury

(By C. B. WONNACOTT, Service Cartage Co., Port Huron, Mich.)

"At present we are operating five one-ton Ford models; one of which has been in use 18 months; two for 12 months and two for nine months. During that time we have not found it necessary to make any but minor repairs such as new commutators and fan belts and an occasional bolt or nut.

"These trucks are driven under all kinds of road conditions from deep mud to deep snow, both in city use and coun-

try trips and are in use nine to 12 hours daily.

"We try not to overload, but have on several occasions, when our heavier equipment was not available, carried two tons on pavements without any apparent injury to trucks.

"As to gasoline and oil consumption, our average for the past six months has been 9½ miles per gallon of gas and 50 miles per quart of oil. We check our

mileage by the Veedor Hubodometer.

"One of our principle items of expense is tire replacement as we discard the factory equipment of fabric tires as soon as they show signs of wear for cord tires which we find stand up much better under the occasional overload due to their oversize.

"We pay particular attention to lubrication and make it a point to fill grease cups and oilers weekly."



Five One-Ton Ford Trucks Which Are Run at Slight Expense and With Paying Results by the Service Cartage Co., Port Huron, Mich.

Loads Up to 28,000 Pounds Hauled by 2½-Ton Truck



Transport 2½-Ton Truck Owned by K. S. Green, Charlotte, N. C., Hauling a 13,000-Pound Tank on Long Trip Over Rough Roads.

It would be a difficult task to find a truck anywhere with more unusual pulling records to its credit than the model 50-A Transport, for 5000-pound service, owned by K. S. Green, 1301 Mint street, Charlotte, N. C. To say that Mr. Green is thoroughly satisfied with his truck and fully appreciates the unusual service it has rendered, but mildly expresses it—he is one of the most enthusiastic Transport boosters in the country. Following are some of the unusual stunts performed by the Green truck as related by N. J. Sherrill, Transport distributor at Charlotte, N. C.:

"Last spring when building my garage I ran short of brick and the only place I could get them was Mt. Holley, N. C., 12 miles distant. I got Mr. Green with his Transport and a six-ton truck of another make to go after 3000 brick. They put 1000 on the Transport and 2000 on the six-ton truck. It had been raining continually that day up until noon and when they got ready to start the six-ton couldn't budge. Mr. Green hitched the Transport onto the other truck and pulled both loads to Charlotte over wet and slick roads.

"The accompanying picture shows Mr. Green's truck hauling a 13,000-pound tank from Charlotte, N. C., to Rock Hills, S. C. The roads were hilly and rough. It would have been a trying test for most trucks with just an ordinary load, but the Transport went right along, at no time giving any signs of laboring under strain. The tank was 25 feet long and five feet high.

"Mr. Green recently had a job moving a piece of machinery weighing 12,000 pounds. He hired a six-ton truck to do the work, but it fell down badly when put to the test. Faced with the prospect of paying demurrage, he loaded the 12,000 pounds on his 5000-pound Transport, placing blocks under the springs, and hauled the load without difficulty.

"On another occasion Mr. Green had a contract to pull some heavy mining machinery from a point six miles in the country near Matthews, N. C., to the railway. Inasmuch as the machinery weighed 28,000 pounds the idea of using

his truck seemed out of the question, so he hired a certain well known make of tractor to tackle the job. The tractor was absolutely helpless, however, and there was nothing left to do but give the Transport a trial. Imagine his amazement when the Transport walked away with the load and landed it safely in Matthews."

SAVES \$2000 A YEAR.



Acme Truck Operated by Oakdale Cotton Mills, Jamestown, N. C., Which Has No Repair Bills.

In May, 1919, the Oakdale Cotton Mills, Jamestown, N. C., manufacturers

of cotton yarns and twine, decided to change from horses and wagons to motor trucks. They made a very thorough investigation of the many different makes of trucks on the market, but finally selected Acme, purchasing two two-tonners. After running these trucks every day for 17 months an official of the company made a statement, which was published in the Greensboro Daily News, Nov. 28, 1920, that during the above period of time their repair bill had been just 18 cents for the two trucks, and that their trucks were running as good then as they did the first day, also that their trucks saved them \$2000 per year in comparison with the horse and wagon method of hauling.

NEW YORK CITY NETS PROFIT ON BUS OPERATIONS.

While New York city had not hoped to make money out of bus operation, it has been proven by the results attained that the city will earn a substantial profit from its venture. On the basis of the first hundred buses operated it is estimated that a profit of \$137,532 per annum will accrue to the city, and this same ratio will hold good if a larger number of uses are operated.

IN THE ICE BUSINESS.

(By P. W. CHRISTOPHER, the Minnechadusa Ice Plant, Valentine, Neb.)

My Douglas ice truck, 2½ tons capacity, hauled three and four tons of ice steadily all summer from June 1 to Nov. 1, running without a stop, delivering ice from 6 a. m. to 6 p. m. It burned 600 gallons gasoline, 36 pounds transmission and differential grease, 24 pounds hard oil. The total repair bill was \$4.85.

My Douglas oil truck, 1½ tons, carries 560-gallon tank always loaded, seven pounds to the gallon, and has been going every day since June 1. The total expense of upkeep has been about \$100. Will make nine miles to a gallon of gasoline in the sand hills.

Our average freight rate is two cents per mile, about 60 per cent. profit.



Douglas 2½-Ton Truck Owned by Minnechadusa Ice Plant, Valentine, N. B., Which Hauls Overloads and Cost but \$4.85 for Repairs.

Market Gardener Finds Truck Cheapest Hired Man

(By NICK EVERT, Market Gardener, 2059 Devon Ave., Chicago, Ill.)

"The market gardener who doesn't own a motor truck is losing money right along. I've had my Atterbury only a year, but it's the best and cheapest hired man I ever had.

"My market is at Halsted and Randolph streets, a round trip of 18 miles. This is about a day's work for a horse.

"Last year I gave up trying to use horses for this work and bought an Atterbury motor truck. It is a 1½-ton with an express body, and will carry from 100 to 150 cases to a load.

"Last year my truck hauled 75 loads of fertilizer from a point nine miles away, making a round trip of 18 miles. This trip would take five hours with horses and would cost me \$3 an hour, or \$15 a load. Using the truck and allowing the same time for loading and unloading it cost \$6.68 a load, or less than one-half what I had been paying for horse hauling. The total saving to me on the 75 loads was \$624.

"Even if I had done nothing else with my Atterbury last year than haul those 75 loads of fertilizer, I would have been money ahead. The actual hauling would have cost me \$259.74. My total fixed expense for this year is \$186.50. Additional depreciation for the time the truck was idle would be \$255.28. The driver's wages for 37½ days would be \$217.24. Making a total of \$918.76 to haul with truck, if it had done nothing else. But it would have cost \$1125 to hire that fertilizer hauled, so I would have saved \$206.24 on this job.

"Then take my savings on coal hauling. Last year I burned 14 carloads of coal, averaging 40 tons to the car, a total of 560 tons. Three-quarters of this, or 420 tons, I hauled myself from a point two miles distant. Before I have always paid the union scale for having my coal hauled—\$1.25 a ton. I paid that rate on the 140 tons I couldn't handle myself.



Fleet of International Trucks Which Prove Economical and Efficient in Hauling Heavy Paper for Kansas City Post.

"In hauling these 420 tons I could make seven trips a day if I worked all day at it. I carried 2½ tons a trip. This is one ton overload for my 1½-ton Atterbury, but the roads are good and the haul is a short one. On this work the truck was running 28 miles a day, instead of the usual 15.6 miles, so it cost me \$11.82 a day, or 67.5 cents a ton. My total saving on this job was \$283.67.

"For the year ending Aug. 1, 1920, my Atterbury worked 290 days and travelled a total of 4230 miles. This gives an average of only 15.6 miles per day. The trip to market is 18 miles, but the truck makes it only three times a week on an average and makes shorter trips on its other jobs. In spite of this low mileage and some idle time the truck is costing me very little.

"It's hard to tell where you're coming out in market gardening. It requires good management, economy and hard work to make money at it, and then something you don't figure on may upset everything. This year I have saved approximately \$1000 on my coal and fertilizer hauling, besides the saving in getting my produce to market.

"I have been so pleased with the way the Atterbury works that I have used it

to demonstrate to other farmers who ought to be using trucks."

TRUCKS HAUL HEAVY PAPER.

The Kansas City Post finds that trucks are most economical and efficient for the hauling of heavy paper and has now standardized on International trucks. How well these machines are performing may be judged from the following letter:

The Kansas City Post,
Kansas City, Mo.

Citizens Motor Truck Co.,
Baltimore, Md.

Gentlemen:

We have been using International Trucks now for about two years on both our delivery and heavy hauling and we think we have just the right equipment.

We find that the operating cost is considerable below any other truck that we have ever used and the service rendered us by their sturdy construction makes it possible for them to be at our door every day to deliver.

We are using four one tons and two two tons and one 3½ ton for heavy paper and all of this equipment is on solid tires.

Yours truly,

THE KANSAS CITY POST.

(Signed)

M. LEVAND,
Business Manager.

STORE DOOR DELIVERY.

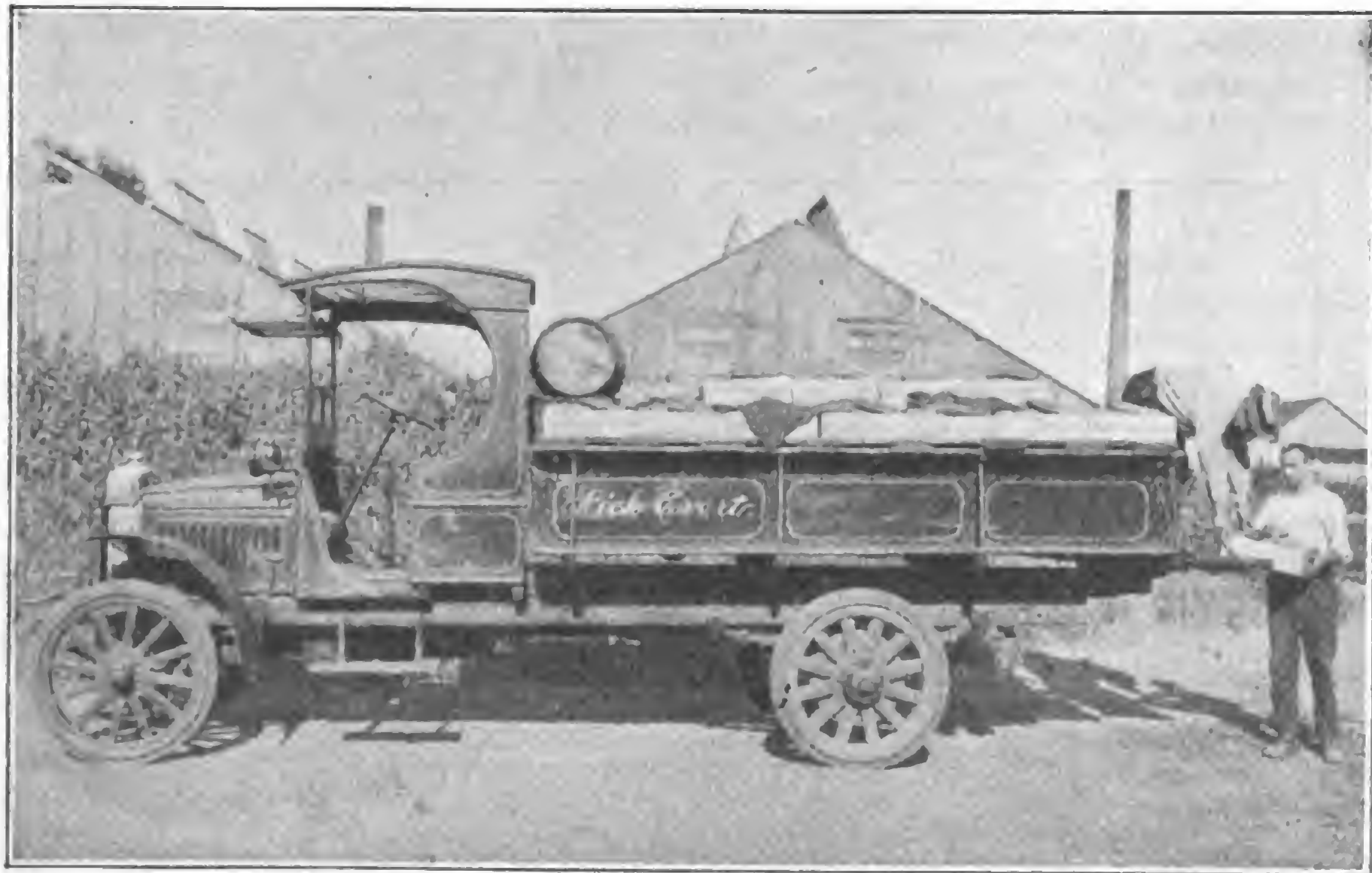
An interesting experiment in the store door delivery of express matter has been undertaken by the New York Central Railway Co. in cooperation with the American Railway Express Co. The plan was put in operation first in Chicago and Cleveland, and standardized trucks are being used in its development.

TRUCKS FOR POST WORK.

The New York chapter of the American Society of Mechanical Engineers has gone on record in favor of the use of motor trucks for the development of the pretentious harbor development project undertaken by the New York and New Jersey Port and Harbor commission.

LOADS ON FRONT AXLES.

The Bureau of Public Roads reports that its investigations show that there would be less wear on highways if trucks were designed to take more of the load on the front axles.



Atterbury 1½-Ton Truck, with Express Body, Which Saved \$624 on One Job for Nick Evert, Chicago Market Gardener.

NEW DIAMOND "T" FARM SPECIAL



Rear Axle and Spring Construction of Diamond T Farm Special. Timken Worm Drive Axles and Timken Bearings Broaden Service of This Truck.

THE Diamond "T" Motor Car Co., Chicago, Ill., has gone into production with a Farm Special truck of 3000 pounds capacity, especially designed for general farm transportation work. This new truck differs from previous models put out by this company only in dimension of parts.

The truck is efficiently powered by a Hinkley engine of the four-cylinder, L-head type, fitted with detachable head. The engine has a bore of $3\frac{1}{4}$ inches and stroke of $5\frac{1}{4}$ inches and develops under the S. A. E. rating 22.5 horsepower at 1000 feet piston speed per minute, and at 1700 revolutions per minute develops 37.5 horsepower, which is considered ample for all purposes.

Unit power plant construction is used, including in the block the engine, clutch and transmission gearset. All necessary cooling surface is provided around the cylinders, combustion chamber and valves, while a large fin and tube radiator, fitted with upper and lower tanks, bolted to the radiator core, holds sufficient water for all cooling purposes. The water is circulated by a centrifugal water pump driven from the timing gearset of the engine, while the water is cooled by a large four-blade fan mounted in the rear of the radiator, driven by a flat leather belt from a pulley on the timing gearset case.

The engine is lubricated by a positive pressure system, which forces oil to the main journals, camshaft bearings and the connecting rod bearings, excess oil from the system overflowing into the timing gearset.

The engine is equipped with Stromberg carburetor, which uses vacuum feed for the fuel, and Bosch high-tension ignition for the engine.

The clutch is contained in the flywheel housing in unit with the engine and consists of a Covert dry disc type. The transmission, also Covert manufacture, is a selective type, having three speeds forward and one reverse, located in unit with the engine.

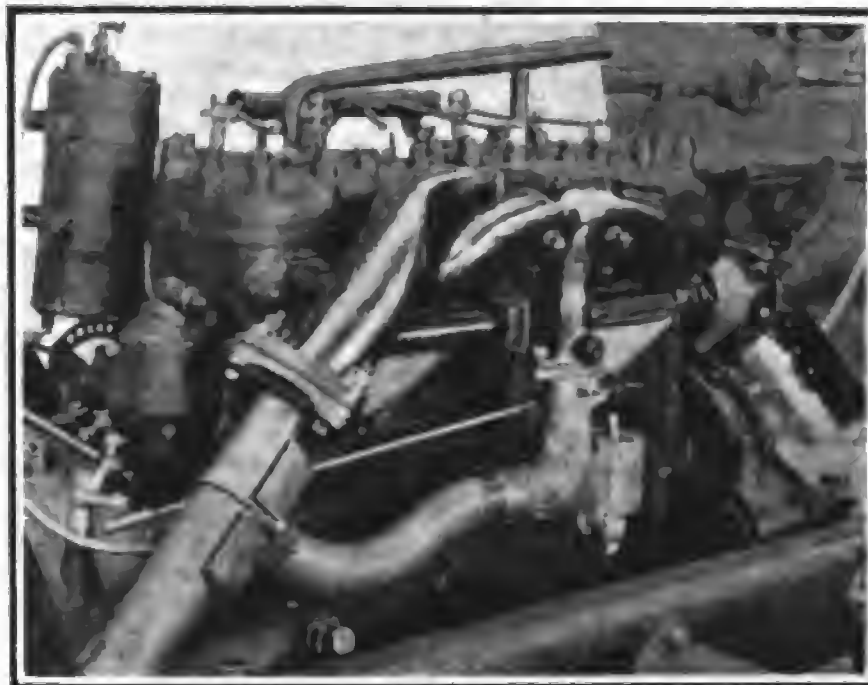
The propeller shaft, which connects the transmission with the rear axle, is divided into three sections. The forward section is fitted with flexible universal joints and the rear section with metallic joints. The center section operates in tapered roller bearing, which is suspended from the center cross member of the frame, and prevents whipping of the propeller shaft.

The rear axle is a worm driven type of Wisconsin manufacture, which unit is strongly indorsed by the Diamond T engineers. The axle employs the overhead worm and is of the semifloating type, operating on ball bearings of the double annular type.

Truck Units of Unusually Large Size.

The front axle is a drop forged I beam section, extra heavy, fitted with Timken tapered roller bearings and a positive locking device for adjustment of the bearings. The brakes are both internal operating on the rear wheel drums and are unusually wide faced with high grade friction linings.

The frame of the farm truck is pressed from strip steel, which insures uniformity of strength throughout the section. The depth of the frame is $5\frac{5}{8}$ inches, width of flange in front $1\frac{7}{8}$ inches, at the widest part $3\frac{9}{16}$ inches and tapering to $2\frac{1}{4}$ inches at the rear.



Right Hand Side of Hinkley Engine in Diamond T Farm Special.

Hotchkiss Drive Employed.

The springs are semi-elliptic, front and rear, designed specially by Diamond company engineers for use with the Hotchkiss drive, which is found in all trucks the company manufactures. The leaves are made of chrome vanadium steel, which has proven to be well adapted for use with this type of drive, mainly because of its great strength. The front spring is 40 inches long, $2\frac{1}{4}$ inches wide and consists of eight leaves. The rear spring is 53 inches long, $2\frac{1}{2}$ inches wide and consists of 10 leaves. The springs are held on the spring pads of the rear

axle by specially constructed spring boxes and clamps, designed to prevent movement of the spring on the pad when the truck is in motion. Bronze bushings are fitted to the spring ends which move on steel alloy spring bolts. The bolts are drilled and fitted with oil cups, which allow lubricant to reach the center of the bushings, preventing excessive wear.

The 18-gallon fuel tank is located under the driver's seat, the gasoline being fed to the carburetor by vacuum. The steering gear is a worm and wheel type located on the left side of the driver's seat, and is equipped with spark and throttle control under the wheel. The control members of the transmission are located at the driver's right.

The speed of the truck is governed by a special type governor located at the rear of the engine cylinder block, which regulates the speed of the truck to 18 miles per hour when equipped with solid tires or to 20 miles per hour with pneumatic tires. The gear ratio on high is $8\frac{1}{4}$ to one.

The regular tire equipment includes solid tires, $36 \times 3\frac{1}{2}$ inch front and 36×5 inch rear. When pneumatic tires are furnished at extra cost 35×5 inch tires are used on the front wheels and 38×7 inch on rear wheels.

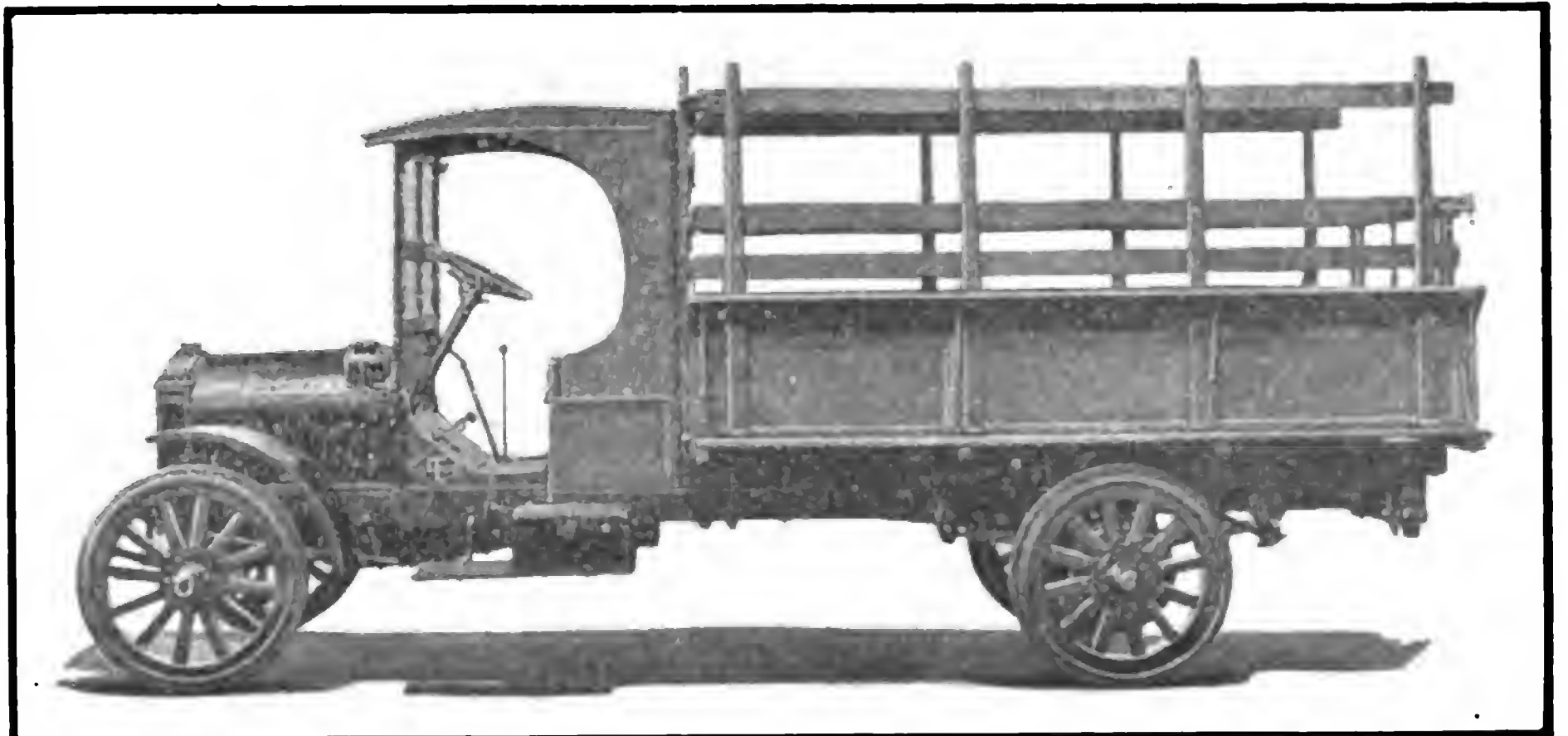
The standard tread of the truck is 56 inches, which is suitable for country roads, and the wheelbase 144 inches.

The regular equipment with the Diamond "T" farm truck includes front fenders, cast steel brackets, running boards, oil tail light. Buell whistle, complete set of tools, jack and tool box, cab with side curtains and windshield, governor and side oil lamps of special high candle power. Prest-O-Lite gas equipment consisting of tank and two head lamps, or electric light equipment, and enclosed cab are extras.

Three Styles of Farm Bodies Available.

Bodies for this truck may be obtained in three separate styles, or in a combination of the three as follows:

Express body, which is 120 inches long by 60 inches wide by 15 inches high, fitted with a flare board nine inches wide, the body heavily ironed, having an outside running board six inches wide, running the entire length of the body, and



Diamond "T" Farm Special Equipped with Open Cab, Express Body and Cattle Rack.

having a pay load capacity of 62½ feet.

The grain tight body, with the same general dimensions as the express body, but with an additional nine-inch grain tight extension panels and extension end gate, making the body sides 24 inches high and having a capacity of 100 cubic feet. The Comstock end gate may easily be removed without disturbing the upper panel.

The cattle type body, similar to the express body, but equipped with cattle rack extension above the sides, which measure 54 inches from the floor to top of rack. The two upper panels are separated by 14 inches to accommodate heads of cattle. Heavy hooks drop in eyes attached to the permanent rack back of driver's cab, making the racks staunch and rigid. A rack extension is also provided for the end gate, which facilitates the loading of cattle.

The body may be changed from one style to another without the use of tools and with absolutely no difficulty.

GMC ANNUAL REPORT.

The annual report of the General Motors Corporation for the year ended Dec. 31, 1920, shows net income available for the common stock amounting to \$30,129,948, equivalent to \$1.57 a share on the 20,284,458 shares of common stock of \$10 par value outstanding at the close of the year.

During the year the company wrote off \$18,502,188 for depreciation in inventory account up to the close of 1920, but in addition to this there was set aside \$7,500,000 for unforeseen contingencies.

Inventories reached their peak about the middle of October, but during the ensuing 10 weeks, to Dec. 31, the corporation was able, notwithstanding shrinkage in sales, to effect a net reduction in inventories of approximately \$25,000,000. In addition, inventories were further reduced by \$25,776,112 at Dec. 31, as a result of charging off all obsolete materials as well as adjusting values to cost or market, whichever was the lower.

Pierre S. du Pont, president of the company, commenting on the outlook in his remarks to stockholders said in part:

"In the early months of the year 1920 there was promise of increasing annual sales and net profits. As stated above, the volume of sales reached this expectation notwithstanding the sudden diminution of business during the latter quarter of the year, but the net profits fell somewhat short of the previous year's record, although far in excess of any other year of the corporation's history. The dullness of the latter months of 1920 has continued during the early months of 1921, but as this report goes to press there is evidence that the year will show a substantial recovery and a reasonably satisfactory business with foundation well laid for future prosperity."

At the Washington, D. C., show the latter part of March 16 trucks were displayed. More than a million dollars worth of passenger cars were shown. Sales were reported and a large number of prospects were lined up.

FIRESTONE SCHOLARSHIP FOR ROADS ESSAY THIS YEAR

With members of the Highway and Highway Transport Education Committee and H. S. Firestone, the donor, present President Warren G. Harding, presented Miss Katharine F. Butterfield, Weiser, Ida., winner of last year's national essay contest, with a certificate entitling her to a university scholarship during exercises on the White House lawn early this month.

Miss Butterfield, who won last year's prize in competition with 225,000 high school pupils, came from a celebrated eastern school, where she is enjoying the benefits of the scholarship, to attend the exercises. President Harding



Miss Katharine F. Butterfield, Winner of Last Year's Firestone Essay Scholarship Contest, Who Received Prize from Hand of President Harding on White House Lawn.

presented the certificate to her at the request of the committee, of which Mr. Firestone is a member.

The ceremonies were made the occasion of an announcement that a renewal of the essay contest will be held this year under the auspices of the Highway Transport Committee. Mr. Firestone offers a four-year scholarship, including expenses, to the high school student writing the best essay on a subject pertaining to good roads.

Rules of the contest, which last year was conducted by the Ship by Truck Bureau, which Mr. Firestone founded, will be virtually the same as in 1920. All high school pupils are eligible to compete, essays must be not more than 500 words in length and must be in the hands of the local committee not later than May 31.

Aid of superintendents of instruction will be enlisted in the conduct of the contest. While no other major prizes have been announced, local and state prizes are expected.

FINANCIAL REPORTS.

The Timken Detroit Axle Co. 1920 report shows a net profit, after reduction of inventories and provision for federal taxes of \$712,508. Its total surplus was \$17,820,062. The company's total assets were \$21,494,863; cash, \$671,150, and inventories, \$10,932,521. Its land, buildings and equipment account was \$8,357,232. The company's total current liabilities were \$3,574,801, of which notes to bank were \$3,000,000 and accounts payable \$387,460.

The report of the Fisk Rubber Co. for 1920 shows a net operating profit of \$5,034,950, against \$4,956,685 in 1919. After the deduction of federal taxes and of the extraordinary charge of \$2,669,117, due to the writing down of inventory, the balance of \$2,110,133 was equal, after preferred dividends to \$1.65 a share on the \$15,582,186 common stock, \$25 par, outstanding. Before the special write off the balance earned was equal to \$5.95 per share of common.

For 1920 the Martin-Parry Corporation reports a net, after charges and federal taxes of \$311,354, equivalent to \$1.11 a share on 100,000 shares, no par. The net sales were \$3,725,434; net income, \$402,875; miscellaneous charges, \$25,886; federal taxes, \$65,635; net, \$311,354; dividends, \$200,000; surplus, \$111,354; profit and loss surplus, \$367,661.

The Kentucky Wagon Manufacturing Co., Louisville, Ky., which manufactures the Old Hickory truck among its many products, reports a net profit for the year ended Dec. 31, 1920, of \$165,041, after all charges and estimated taxes. Gross sales of the company for the year were \$4,038,072, from which operating profits were \$374,613. The balance sheet at the end of 1920 shows total assets and liabilities of \$4,647,777. Capital assets were \$1,047,387; current assets, \$3,546,606, of which inventories account for \$3,199,889; and deferred charges, \$53,784. Current liabilities are shown as \$2,121,754 and surplus \$601,449.

Acason Motor Truck Co. will increase its capital stock \$150,000 by the issuance of eight per cent. cumulative preferred stock in denominations of \$10 a share. The issue will be disposed of through the company's connections to eliminate brokerage charges.

Thomart Motor Co. reports the sale of \$750,000 of the \$1,000,000 stock of the first issue, sold between August, 1920, and March, 1921.

BUMPERS CUT INSURANCE.

A reduction of five per cent. in collision insurance rate on commercial cars and trucks equipped with either a radiator guard or a bumper, or both, has been authorized by the National Automobile Underwriters' Conference. This is made with the provision that such device or devices have been listed as standard by the Underwriters Laboratories, and is contingent on there being at least two truck bumpers and two radiator guards listed prior to July 1, 1921. The ruling takes effect on that date.

GRASSI DIRECTING REPUBLIC SERVICE.

H. Y. Grassi is director of service of the Republic Truck Sales Corporation and will be in charge of the company's comprehensive system. He has been connected with the service department of the Republic company and supervised the installation of standard service records.

The motor car has become an indispensable instrument in our political, social and industrial life.—Pres. Harding.

Internal Combustion Engine Will Save Trolley Lines

Can Also Be Operated More Economically Than Short-Line Steam Roads in Carrying Freight and Passengers—Automotive Engineers Must Develop Special Unit.

Thomas M. Walsh.



Two Reo Trucks, Which Operate as Unit on Middletown & Unionville Railroad at Low Cost of 14 Cents Per Mile.

KNOCKING at the door of the motor truck industry is the opportunity to gain in the passenger transportation field a footing akin to that already secured in the realms of freight transportation.

Trolley lines, swamped in debt, and with no hope for the future, and short railroad lines, due to be abandoned, would welcome with open arms a solution of their problems.

The motor truck has stepped in and saved many of the short railroad lines in the matter of hauling its freight.

It can do the same in the carrying of passengers. There are over 600 such lines waiting to be shown a way out of their difficulties.

The internal combustion engine and a modified truck of special design is the answer to the present trolley dilemma, which is country-wide. The use of trucks by all the trolley companies not making both ends meet today would keep every truck factory in the nation humming for months, if not for years.

MOTOR TRUCK has called the attention of a leading official of an important street car company to the utility and economy of gasoline-run equipment and this trolley man opened his eyes and conceded that the subject is worthy of a thorough investigation by every street railway concern in the land.

It is up to the truck industry not to wait for these investigations, but to invite them and to furnish facts and figures to the trolley corporations.

The average cost of electric-driven railroads in the United States today is something like 40 cents per mile.

At 14 Cents a Mile.

The Middletown & Unionville railroad in New York state is operating over a

15-mile stretch of road and carrying passengers at a total cost of 14 cents a mile.

If this economy can be achieved why should not the truck replace the trolley in every corner of the United States?

The Middletown & Uniontown railroad uses two Reo trucks, back to back. The motor of one truck furnishes the power in one direction and vice versa. This company not only finds a saving in cost, but also that the patronage has doubled since the clean, comfortable trucks replaced the steam cars and their soft coal accompaniment.

The point has been raised that the high value of copper wire and other trolley accessories today would mean that any street railway company could dispose of its material assets and easily net enough to thoroughly equip with gasoline-driven apparatus. Power stations and other expensive adjuncts to the trolley roads would be eliminated under the motor-propelled system.

Motor trucks on rails are not a novelty. The experiment is being tried with success at various points. While all of these installations have come up to the mark and proven profitable, it is admitted that in solving the trolley and short-line railroad problems on a mammoth scale the equipment that will best fit the job must be developed by the truck industry.

Method of Adaptation.

It would seem that the most efficient adaptation of the gasoline engine for supplying the motive power, heat and light required in the operation of electric propelled public conveyances guided by rails would be a unit power plant so designed as to occupy approximately the same relative position and to replace the present electric motor on each truck of electric car equipment.

This would possibly involve a rearrangement of some of the units going to make up the typical street car truck assembly, but most of the present equipment could be utilized just as found in use today.

The required flywheel for storing energy in the form of momentum so necessary to the internal combustion engine would only require enlarging to care for the greater load, and the additional traction secured by increasing the number of drivers from two to eight wheels would serve to offset the loss of traction brought about by the mounting of the gas engine on metallic drivers instead of rubber tires as is generally found necessary with a two-wheel drive. The addition of driving wheels also affords a



Service Truck Which Satisfactorily Serves Patrons at Reduced Costs for Winchester & Western Railroad Co.

greater braking surface, for the brakes could then be applied to all wheels.

Starting up and coasting would be accomplished by an adaptation of the automobile disc or dry plate clutch with engines mounted on trucks at either end of the car transmitting power through a single-unit three or four-speed train of transmission gears not unlike those made use of in modern automobiles. Both engines should be controlled and operated from either platform of the car, making necessary only the use of an additional reversing train of gears and removable control handles for the brakes and throttle, the spark advance and retard action being automatic and requiring no attention.

Exhaust gases passing through radiating coils, together with excessive heat in the cooling system made use of during the cold weather would be sufficient for all heating requirements and the lighting would be cared for by a generator and storage battery, as is general practise in modern automobile construction.

Some years ago the American and British Co., Providence, R. I., constructed a vehicle in the form of a low gear, which was equipped with a four-cylinder, vertical engine, using gasoline for fuel and driving an electric generator which supplied power to small motors in each wheel hub. This idea might, with a few changes, be adapted for buses run on rails.

A four-wheel drive truck with engine located as in the Autocar would be the best combination of present truck advancement for rail operations it would appear.

Midwest Engine in Use.

The internal combustion engine is now being used as standard equipment by the Bowen Motor Railway Corporation of St. Louis, Mo. A Midwest heavy duty engine is used to supply power for the operation of the car, this engine being selected because of its high torque, which is considered necessary in this work, as an engine must not only be capable of great torque at low speeds, but must also show high speed as well.

The Midwest engine, fitted to a 30-passenger car, has been given repeated tests and has proved well suited to the

Bowen company's needs. When it is remembered that the Bowen Motor Railway car seats 30 passengers and must negotiate grades and curves under full load, when necessary, it will be seen how much engine performance means in service of this type.

In mounting the Midwest engine on the Bowen car the frame of the car extends forward and the engine is mounted on this frame extension, with the radiator mounted crosswise of the extension in front of the engine in the conventional position. A cowcatcher is fitted under the front end of the extension and is braced to the extension frame by suitable steel braces. A four-wheel truck is used under the forward part of the car and two single wheels form the rear driving members. The control of the engine and car is in a cab provided in the front end of the car, while suitably arranged airbrakes also operated by power obtained from the engine, control the speed of the car when stopping.

The forward four-wheeled truck is provided with regular railway type springs, while the rear springs are of a special type, consisting of two separate springs, the centers of which are attached to the ends of the truss-like frame, which, with the journal, form the end bearing for the driving axle, the ends of the springs being attached to the car frame.

The Bowen car is designed to be driven in one direction only and at the end of the line is turned by means of a turn table, which reverses its direction of travel.

The Winchester & Western railroad has recently installed a passenger service which is unique, and it is predicted by competent persons that it may revolutionize the passenger service on short line railroads.

This railroad is now operating from Winchester, Va., to Wardensville, W. Va. The car is a powerful gasoline motor truck. It is equipped with a commodious body which seats 34 passengers comfortably, is well heated and electrically lighted.

This body is mounted on a 2½-ton Service motor truck, manufactured by the Service Motor Truck Co., Wabash, Ind. The wheels are the same as on reg-

ular Service trucks, but instead of rubber tires flanged iron tires are used, which are the same as those used for the pony wheels of the largest locomotives. The rims are about one inch thick.

The truck runs on schedule time and is hauling almost capacity loads. It arrives at Winchester at 9 a. m. and leaves at 3 p. m. Passengers are most enthusiastic over the new car and prefer it to a regular passenger coach. There is no smoke, no dust, no cinders and but very little noise.

The Winchester & Western railroad has already announced "theater special" runs for the truck every Wednesday and Saturday evening, and the car will be available for special trips to town on any special occasions which may warrant it.

FWD'S in Service.

Following the success scored by the Palatine, Lake Zurich and Wauconda railroad, which has had similar equipment operating profitably on a 16-mile run for nearly a year, the New Orleans and Lower Coast Railway recently put a railway motor car, with standard FWD truck chassis, into service over a 60-mile route from Algiers to Buras, La.

Instead of a crew of four men one does all the work. A speed of 25 miles an hour is obtained at an average of 7½ to nine miles on a gallon of gasoline, according to the size of the grades, number of turns and frequency of stops. Figures show that the cost of operation is 25 per cent. less than the steam service.

The standard FWD truck chassis has steel flanged wheels instead of the rubber tired ones, and a passenger body mounted on the frame. With the exception of the use of the flanged wheels the standard construction of the truck remains the same, the regular motor used in the truck for ordinary hauling requirements furnishing the power. The car is equipped with Master Car Builder coupler and can be used for switching or hauling a trailer.

The starting and lighting system is furnished by a 24-volt single-unit system, which furnishes power for four dome lights, headlight and rear marker lights.

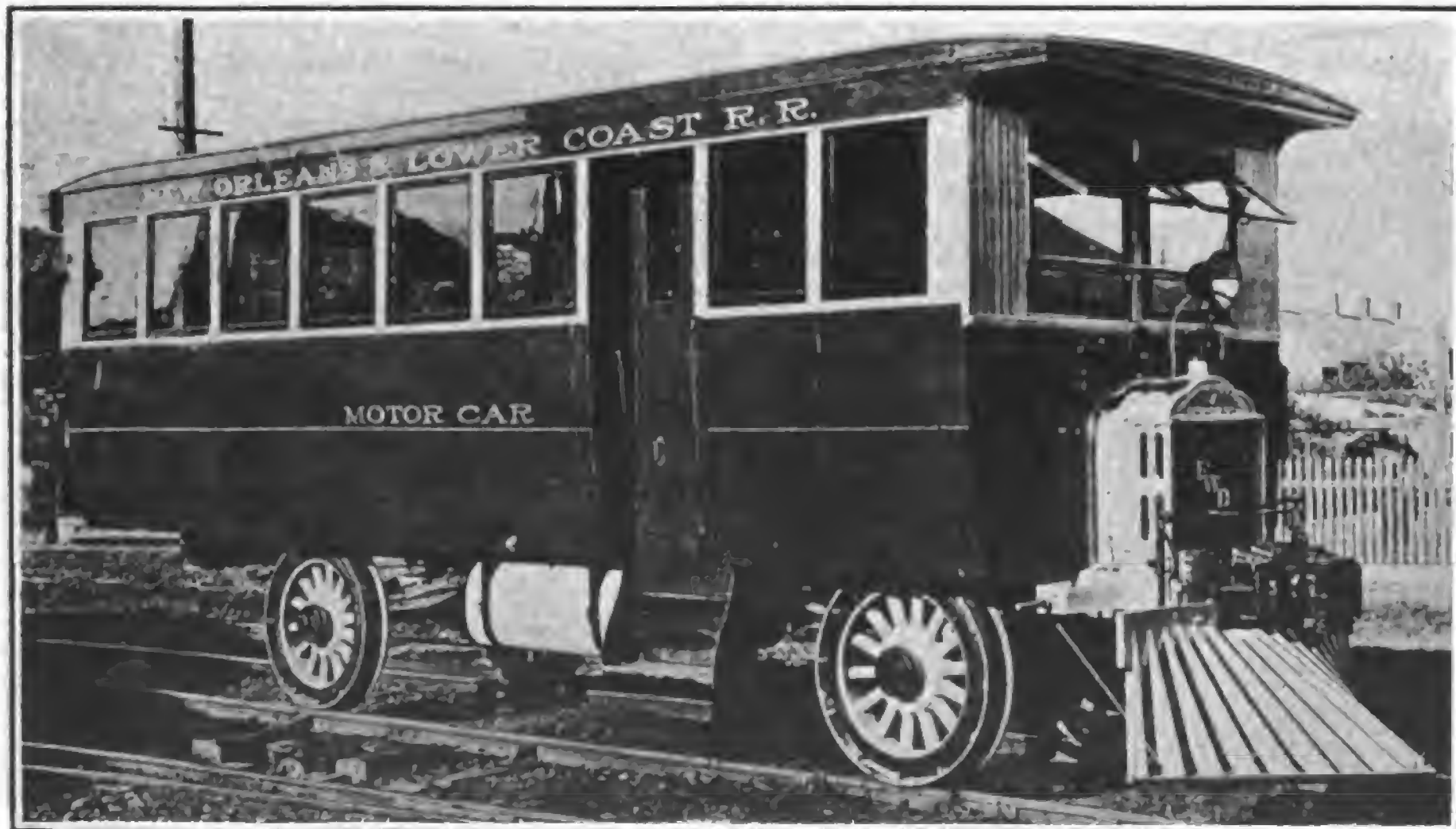
The exhaust gases from the motor are used to heat the car. This is done by means of a take-off which converts the hot gases from their regular channels through a series of pipes running at the sides, making the car as comfortable as any Pullman.

A Republic on Rails.

When the Pittsburgh & Susquehanna Railway Co. installed a Republic motor bus on a spur line of railroad between Philipsburg and Ramey, Pa., it did so to accommodate the people of the two towns, and those living along the line. There was no thought or hope of profit.

The chassis is the standard model 19. 2½-ton, fitted with demountable steel railway rims on the rear wheels, and the front axle and wheels replaced with a four-wheel pony truck which follows the curves. The bus seats 28 passengers in two compartments.

The bus makes four round trips per day, running on a regular railroad schedule, with 12 regular stops. There are 10 or 12 additional stops at mines, etc. The running time, each way, is one hour.



FWD Truck in Railroad Service Over 60-Mile Route from Algiers to Buras, La.

There is not a mile of straight track in the entire 14, and there are several $1\frac{1}{2}$ per cent. grades. Yet the Republic easily makes its schedule time and maintains an average speed of 25 miles per hour.

The railroad's report of the first 52 days of operation of the bus shows 6032 miles traveled, gross revenue of \$2120.95, total expense of \$1522.66, and net earnings of \$598.29, or 9.9 cents per mile. The results of the bus operation have so impressed the railroad officials that a Republic trailer, with railroad rims and special box car body, has been installed for baggage and express business, and two more Republic trucks are soon to be put into service on the same line.

MOTOR TRUCK is indebted to

Donald A. Hampson, 31 Hanford street, Middletown, N. Y., for a full report of the operations of the Middletown & Unionville railroad, which with two Reo Speed-wagons, are running at one-third the cost of trolley transportation.

Mr. Hampson's letter follows:

Middletown, N. Y.

March 19, 1921.

Editor of **MOTOR TRUCK**,

Pawtucket, R. I.

Dear Sir:—

In the March issue I noticed an account of a motor truck carrying passengers on the Pittsburgh & Susquehanna Railroad.

There is no doubt as to the practicability of such means of transportation. The motor truck can haul more load on the rails than on the highway because there are no grades, as grades are known on the roads. Its "road" is always level and smooth. There are no corners where the speed has to be slackened—no chance to take corners at high speed, thus imposing the terrific stresses on tires, wheels and bearings that the truck driver does when he makes them on high. And the tire item, the biggest item of upkeep, automatically disappears with the application of railroad wheels.

In connection with the photograph you have published I might add that the wheels they have on their pony truck will not last over 12,000 miles. They are the pressed steel type made for hand car work, where loads are light, speeds slower and mileage much less. The grade of steel is soft, of necessity, to permit forming to the wheel shape cold. The thickness is about $\frac{1}{4}$ inch and this will wear through on the flanges so the wheels are unsafe in the time I have mentioned. I have been through this part with the Middletown & Unionville Railroad, who are successfully operating motor cars, and now use wheels whose life has not yet been determined, as nearly half a million miles covered have yet failed to wear them to anywhere near the discard point.

Get Extra Patronage.

The photograph enclosed shows a motor train on the Middletown & Unionville. This railroad runs from Middletown to State Line Junction, a distance of 15 miles, and connects

at each place with trunk line roads. The running time is 40 minutes, which is remarkably good when considering the total of seven stops that are made. Five round trips a day are made. These with two trips of a steam mixed train serve the rural community and the through traffic remarkably well. Passengers prefer to ride on the "buses," as they call them, instead of the train because of the greater speed and cleanliness. One trip a day of the steam train is dispensed with. The latter made the four station stops only, while the motor car train makes three flag stops at crossing, which are a great convenience to passengers who would otherwise have to go a couple of miles to the nearest station.

This train was put in service in March, 1919. It is still running. There exists a popular belief that motor trucks will not stand up on the rails; with a little care and some painting and renewal of inexpensive bearings, such cars will last as long on the rails as on the roads. (Locomotives are inspected at the end of each run and minor repairs made then—and every year or so they are put in the back shop for an overhauling that costs more than one of these gasoline cars new. All this by experienced workmen. The inconsistency of expecting a gasoline car to stand up when it is uncared for and handled by green help is at once apparent.

Orders Two More Reos.

The cars shown have pressed steel front wheels; the photograph was taken before the change above referred to was made. These are Reo trucks and they have 24-passenger bodies mounted on them. The bodies have side seats. The Middletown & Unionville Railroad now has two more of these Reo cars ready to be put in service the middle of April; one of these is a 19-passenger car with rattan cross seats and the other a 31-passenger with similar equipment. (This shows what one road thinks of the proposition after having tried it—I am sending photo of

the old cars for the men who think they will not last.)

J. A. Smith, V. P. and G. M. of the road, conceived the idea of greater capacity and of avoiding the loss of time in turning around by the method of coupling the cars back to back as shown. One car is the motor car each way and pulls the other as a trailer. At the end of the line the driver locks his controls, walks through to the other car and starts on the return trip.

Highly Profitable.

Mr. Smith's records of operation show that the entire cost of running this train is 14 cents a mile, including a depreciation charge which will wipe out the original investment in three years. As his passenger rates are $4\frac{1}{2}$ cents a mile, it may readily be seen that his average loads of 24 to 30 people are highly profitable. A steam passenger train operated for this traffic would not pay its own running expenses, let alone provide for a depreciation charge.

Another feature of this mode of transportation is that it induces riding. At the end of the first six months it was found that the number of passengers carried was double that carried in any previous similar period. This shows that the right kind of service will build up traffic that was lying dormant or was being diverted to automobiles by an inconvenient steam schedule. This particular railroad is paralleled by a good state highway.

The brakes on both cars are controlled by the driver at all times. Sand boxes are provided as shown. Heating by exhaust. For greater speed, a higher gear ratio is used than comes in the Reo truck for the road.

STEEL PRICES CUT.

Substantial reductions in prices were announced April 12 by the U. S. Steel Corporation. They are effective at once. They range from around 10 per cent. to more than 15 per cent. The cut applies to all of the company's subsidiaries.

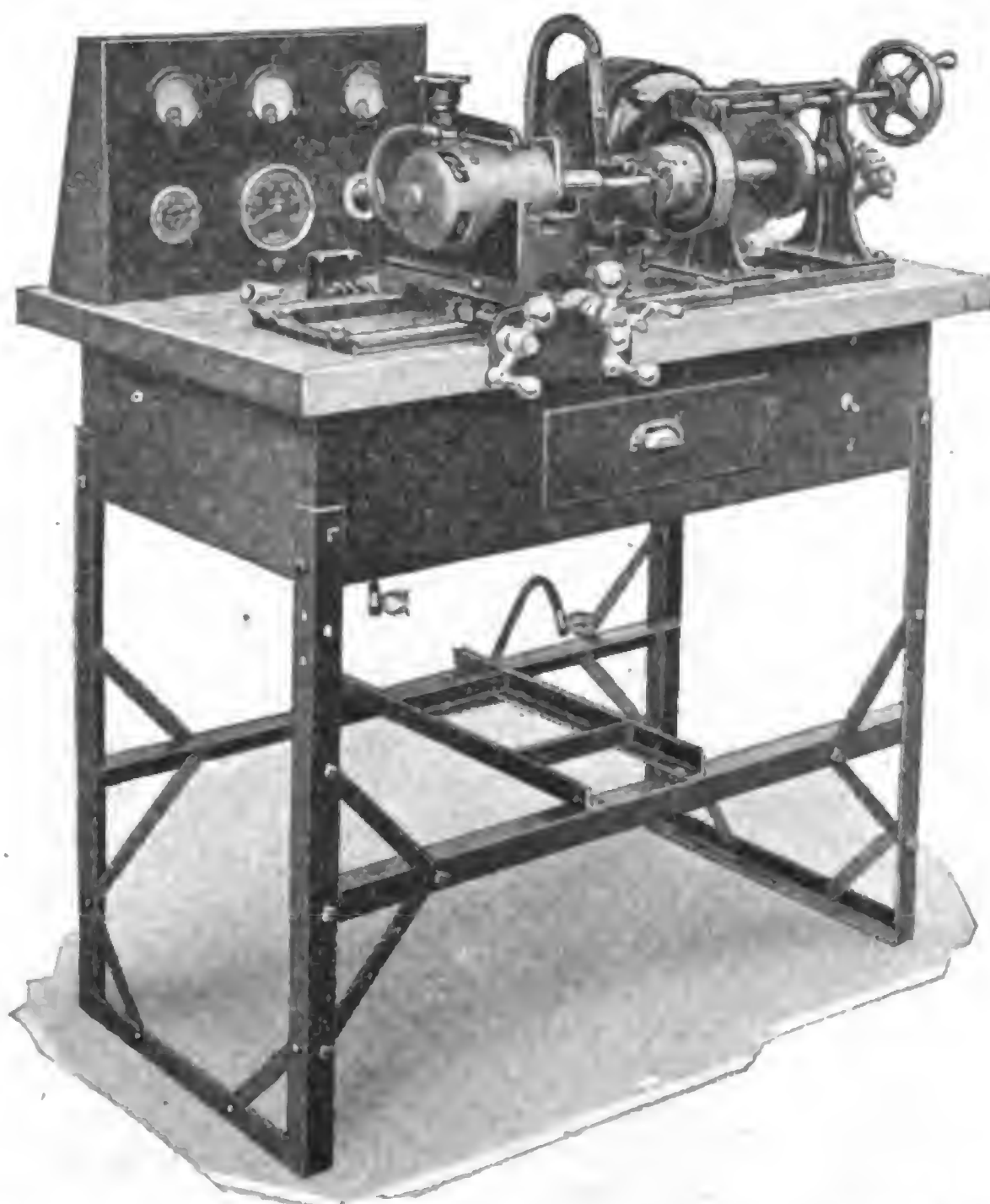


Republic Truck Used in Railroad Service, Which Not Only Satisfied Patrons, but Yields a Profit.

Garage and Service Station Machinery Tools and Equipment

ELMCO UNIVERSAL TEST STAND.

The Electric Machine Co., Indianapolis, Ind., announce a new test stand, which is designed to test the various makes of generators and starting motors, generally used in motor trucks for either electrical or mechanical faults. The simplicity of construction of all the adjustable parts, and the fact that they are free from vibration at the first setting,



reduces materially the time required in preparing work for inspection. The lathe feature allows for a large variety of work, and as the stand has been designed for the inspection and adjustment of electrical units of every nature, the type of construction makes it very efficient for this purpose. The dual serviceability of the machine will at once appeal to the electrical repairer, as it offers him a device that combines two machines in one.

Many special features are embodied in this machine such as a repulsion indicator motor, which is guaranteed to withstand 50 per cent. overload and can be connected to either 110 or 220 volt alternating current, either single or three-phase circuits.

A friction type transmission is used, which allows the machine to maintain a steady number of revolutions per minute. This is of special design and delivers to the chuck more than the maximum torque of the motor without injury to the working parts.

A lathe attachment accompanies each machine, which allows it to be used as a lathe for small work. One of the V blocks on the holding carriage is removed by turning the ball crank and a tool rest, supplied with the machine, is fixed to

the remaining block, which can be controlled by the cranks to take an even cut. The driving chuck is made rigid by tightening a centering sleeve and a tail stock is mounted on the bed of the machine for centering the work.

SEWELL CUSHION WHEEL CROSS CHAINS.

The Rowe Calk and Chain Co., Plantsville, Conn., shows a special type of cross chain for use with Sewell Cushion wheels for motor trucks.

Sewell wheels are now made with either six or eight $\frac{1}{2}$ -inch holes drilled through the felloe, according to the size of the wheel. With the cross chain equipment for this type of wheel is included a sufficient number of $\frac{1}{2}$ -inch bolts, which are $\frac{3}{4}$ of an inch longer than the width of the felloe. The bolt is threaded $\frac{3}{4}$ inch on each end to receive drop forged loop eyes, one with a flat bottom for the inside of the wheel and one with tapered bottom, as the outside of the hole is countersunk. The cross chain is attached to the eye loops with either chain lock hooks or lock links, both of which are drop forged and heat treated. The lock links are standard equipment and the lock hooks may be substituted on request.

Four-inch single tires take four-inch bolt, five-inch takes five-inch bolt, etc.



Four-inch dual tires take nine-inch bolt, five-inch dual tire 11-inch bolt, six-inch dual tire takes 13-inch bolt and seven-inch dual tires takes 15-inch bolt.

PORTABLE TESTING INSTRUMENTS.

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., is in production with a new type PX portable instrument of the direct reading type, which is especially adapted to truck

service station purposes.

The movements are made very light, assuring minimum pivot and jewel wear, and no injurious effects from shock or vibration. The cases are made of mould-



ed composition, which is exceedingly strong and acid resisting. The complete movement is mounted as a unit and is accessible for repairs by taking off the cover and removing the four corner posts, releasing the sub-base upon which all of the parts are assembled.

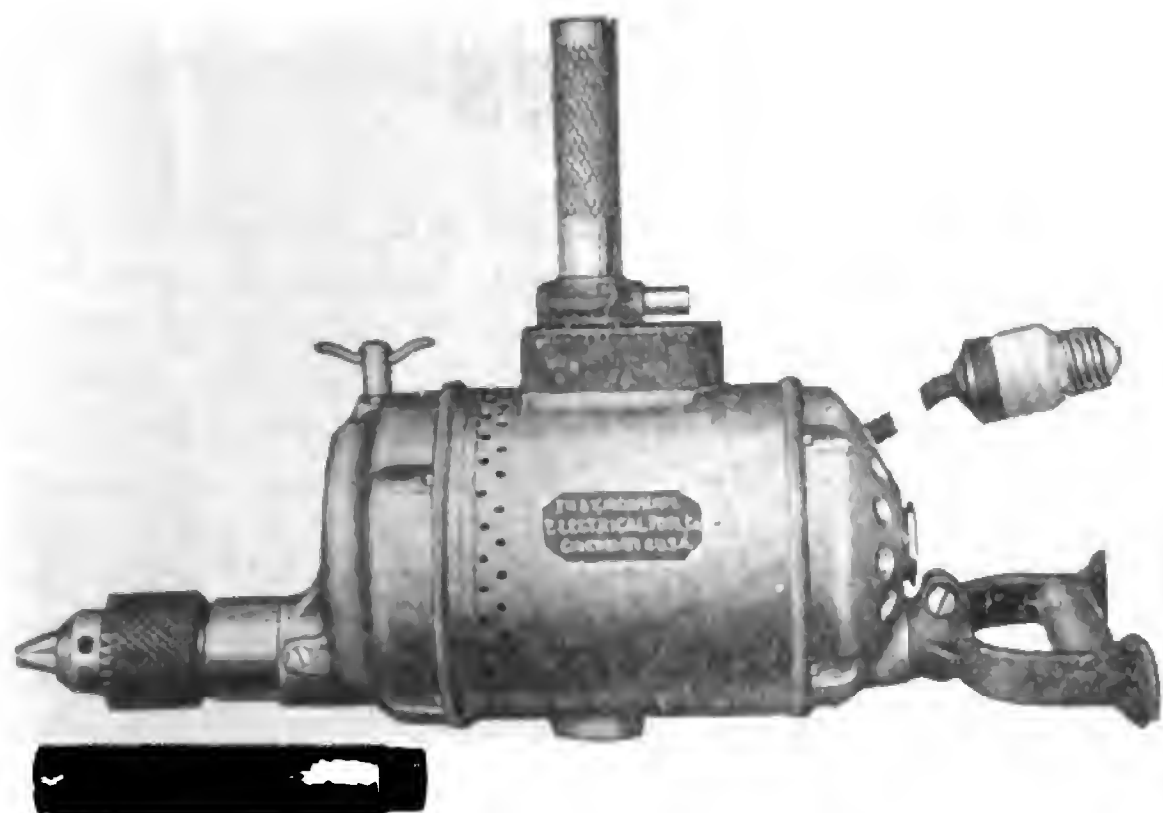
KWICK-WAY VALVE FACING MACHINE.

The Cedar Rapids Engineering Co., Cedar Rapids, Ia., is manufacturing a new valve facing machine for truck service station use which has recently been perfected for the purpose of refac-



ing engine valves preparatory to grinding. The valve is positioned in a specially designed chuck and rotated while the face of the valve is being ground with a high speed grinding wheel. The chuck shaft, grinding wheel and electric motor are mounted on a cast iron base.

The engineering department of the company has designed a chuck that will properly center a worn valve, and is composed of two three-jaw chucks in one, each working independent of the other. A graduated dial on the machine allows grinding valves at any angle from 25 to 65 degrees.



CINCINNATI TWO SPEED DRILL.

The Cincinnati Electrical Tool Co., 1501-3-5 Freeman avenue, Cincinnati, O., is showing a new one-half speed drill, which is fast becoming popular with service stations and machine shops. The company also manufactures a complete line of portable electric drills and grinders, including tool post, bench, floor, hand and aerial types.

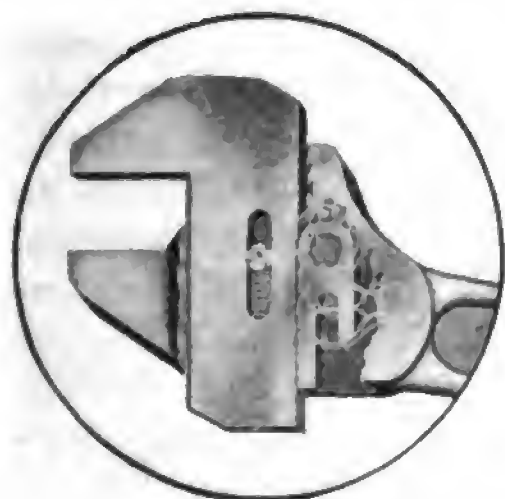
The two-speed feature of the drill makes it an especially practical tool for all-round work, as the speed may be changed by shifting a wing nut when the drill is operating without possibility of stripping the gears.

A universal motor is fitted to the drill, which will take either direct or alternating current, and the voltage required should be stated when ordering, as the motors are wound for either 110-125 or 220-250 volts, and the drill may be operated from either a lighting or power circuit, as desired.

Aluminum housings, high grade steel in the gears and annular ball bearings are special features of the Cincinnati two-speed drill which recommend it to the trade.

EDSTROM UNIVERSAL WRENCH.

Jessop and Thompson, 1421 S. Michigan avenue, Chicago, Ill., is now producing a new universal wrench that is meeting with ready sales. This wrench is fitted



with special jaws suitable for pipe or round stock and is instantly adjustable and locked by the action of the thumb nut. The improved jaws are made of steel and are instantly replaced in case of breakage or wear.

APEX PUMP CONNECTION.

The Apex Electric Manufacturing Co., 1410 West 59th street, Chicago, Ill., is producing a new pump connection to be used by service stations in fitting the end of the free air hose for tire inflation.

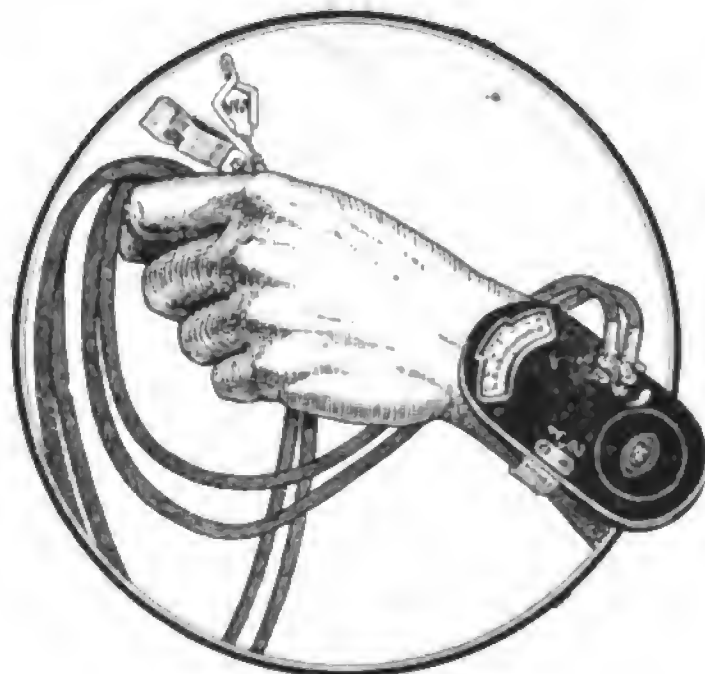


The new connection can be instantly attached to the tire valve by a half turn of the lever, which compresses the rubber bushing, fastening the connection securely to the tire valve, permitting it to become positively locked, so that it will not leak or blow off. An upward turn of the lever releases the connection and there are no threads to burr or become damaged.

ONAN WRIST METER.

David W. Onan, 43 Royalston avenue, Minneapolis, Minn., has patented a device for quick testing ignition systems, which straps around the repairer's wrist and is provided with two leads, which connect to the instrument under test.

It will be noticed that it is a combination instrument, comprising an ammeter, automatically protected against blow

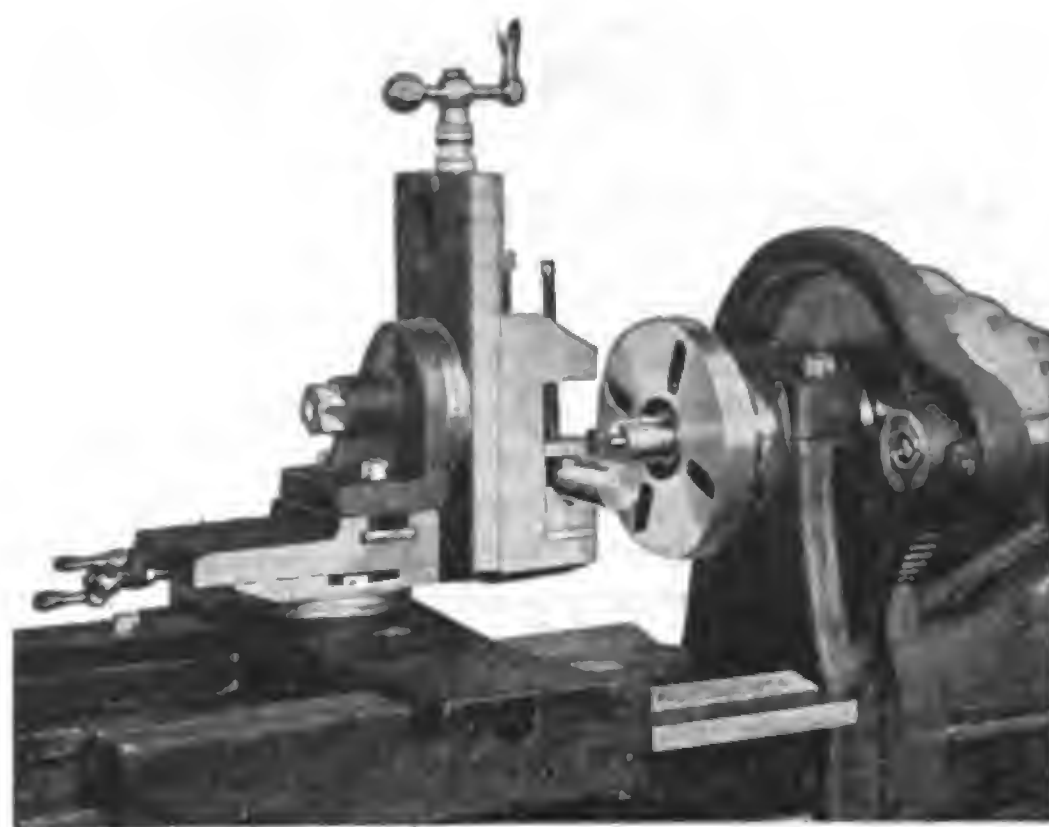


out; a circuit signal, which will indicate a circuit or the absence of the same, and automatic breaker with condenser for testing all kinds of ignition systems, spark plugs, secondary parts or even for starting a high tension magneto with the use of battery current, as well as a storage battery drop tester. A complete instruction book accompanies each instrument, making easy the work of the tester.

NEW BARNES MILLING ATTACHMENT.

The Barnes Drill Co., 814-830 Chestnut street, Rockford, Ill., is manufacturing a new milling attachment which fits any Barnes sliding expansion gap lathe, that is 12/32 inch, 13/22 inch and 14/24 inch and may also be fitted to other makes of lathes, 12 inch to 18 inch, equipped with compound rests.

The milling attachment is handy for a wide variety of work, such as the cutting

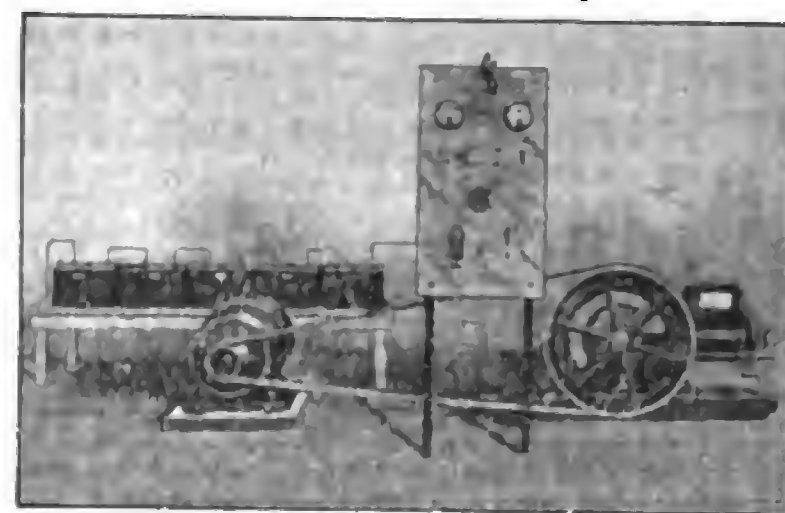


of seats for Woodruff keys, splining and squaring shafts, sawing, splitting bushings, drilling and boring small parts.

The equipment consists of the milling attachment complete, as shown, with steel V block steel plate, gib and bolts for attaching and bell crank handle. Cutter and arbors are not included.

NEW MAIN MCF LIGHTING AND CHARGING SET.

The Main Electric Co., Cleveland, O., is exhibiting a new MCF lighting and charging set for the isolated garage or



service station, which has many features to recommend it to the user. The set consists of a main 600 watt, 40 volt direct current generator, a 1½ horsepower gasoline engine belted to the generator and a 16-cell sealed glass jar type storage battery for the lighting of the garage and an extra panel on the switch-board for charging from one to 10 six volt or 12 volt batteries at one time.

A set of this type is especially valuable to a truck or tractor service station which is located at a distance from power lines and offers an opportunity for handling a large amount of storage battery work.

FOUR-WHEEL HYDRAULIC BRAKING SYSTEM.

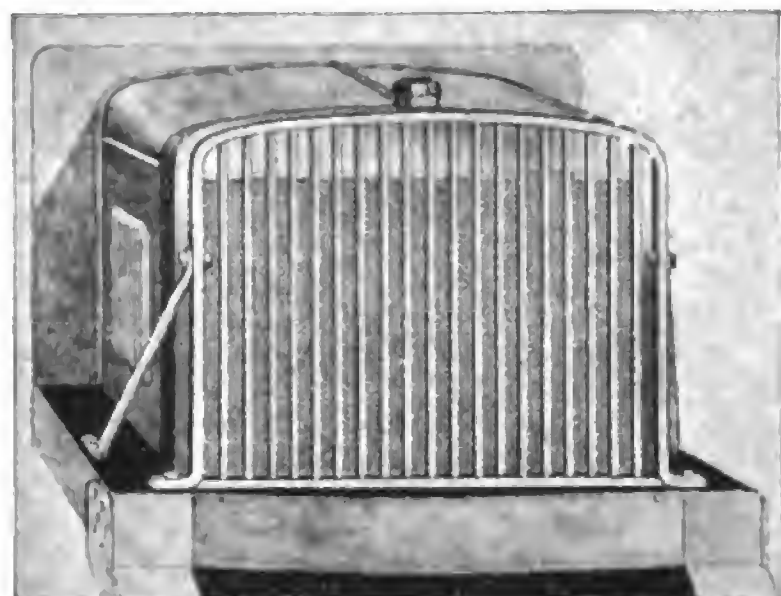
The Four-Wheel Hydraulic Brake Corporation, Detroit, Mich., are in production with a braking system which is at present adapted to passenger cars, at present the system is available for Pierce-Arrows and other cars will be added later. The price installed on a Pierce-Arrow is \$250.

Essentially the system employs brake bands of the usual type. The old brake pedal is removed and a new pedal pad and plunger installed. Depressing the pedal pushes down piston of master cylinder, forcing oil through connecting pipes to individual brake cylinders.

New Motor Truck Accessories

STEWART RADIATOR GUARD.

The Stewart Iron Works Co., Cincinnati, O., is showing a radiator guard which it manufactures special for motor trucks. The guards are placed in front of the radiator and, in case of accident, the radiator is prevented from being damaged. The guards are constructed of



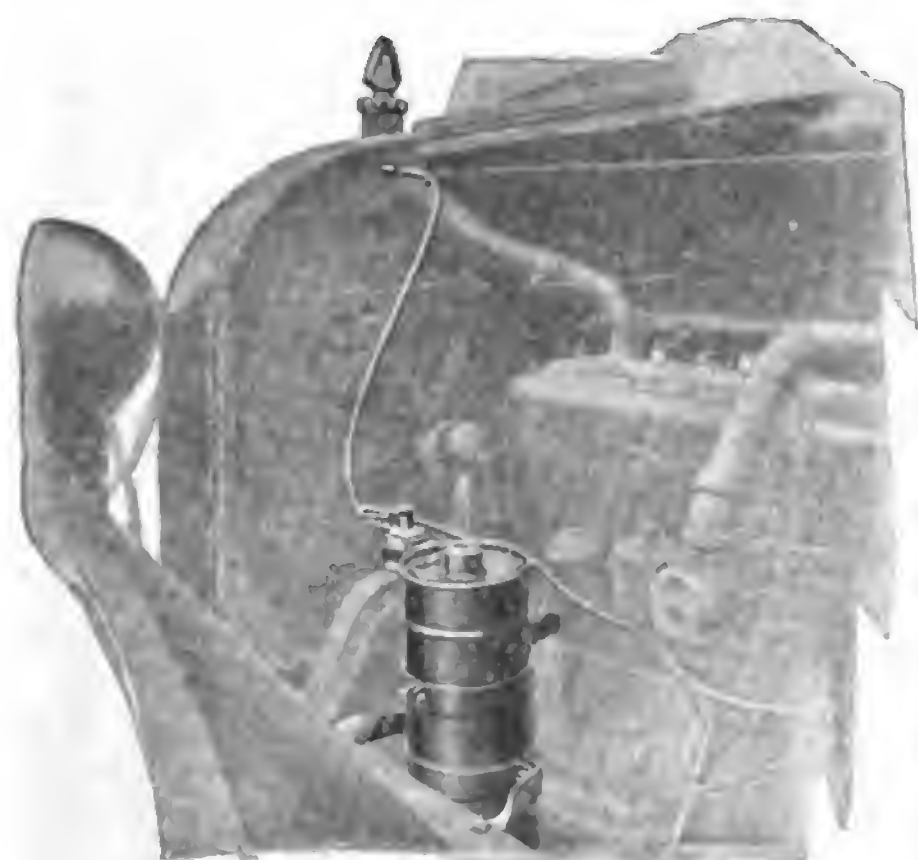
heavy steel bars, welded top and bottom to a frame, also of steel, and bolted at the bottom to the truck frame and braced from a point near the top by steel braces, which also bolt to the truck frame and to the guard.

Most accidents occur around crowded terminals and in congested traffic and a guard will often pay for itself in one accident the saving in time and repairs more than covering the outlay.

WEEKS RE-FLOW SYSTEM.

The Weeks Manufacturing Co., 421-37 National avenue, Milwaukee, Wis., is in production with the Weeks Re-Flow System, formerly known as the Camel System, which is adapted to all forms of motor vehicles using the internal combustion engine for power.

The system consists of a reserve tank which catches and condenses all steam and water which would ordinarily escape from the radiator. A float controlled valve is connected to the radiator and to the intake manifold. If the water in



the radiator falls this valve opens and the suction of the engine creates a partial vacuum in the top of the radiator, which in turn draws water out of the Re-Flow tank to refill the radiator. When the proper level is reached the valve closes.

Vapor is also supplied constantly into

the intake manifold, which humidifies the carburetion mixture to a safe degree. A reserve supply of water is carried in the Re-Flow tank and a warning whistle blows when this supply is exhausted. Installation of the Re-Flow system is very simple on any truck and greatly enhances the use of the vehicle in heavy duty service, as the possibility of the engine overheating under continued service is greatly reduced.

STOP THIEF CAR LOCK.

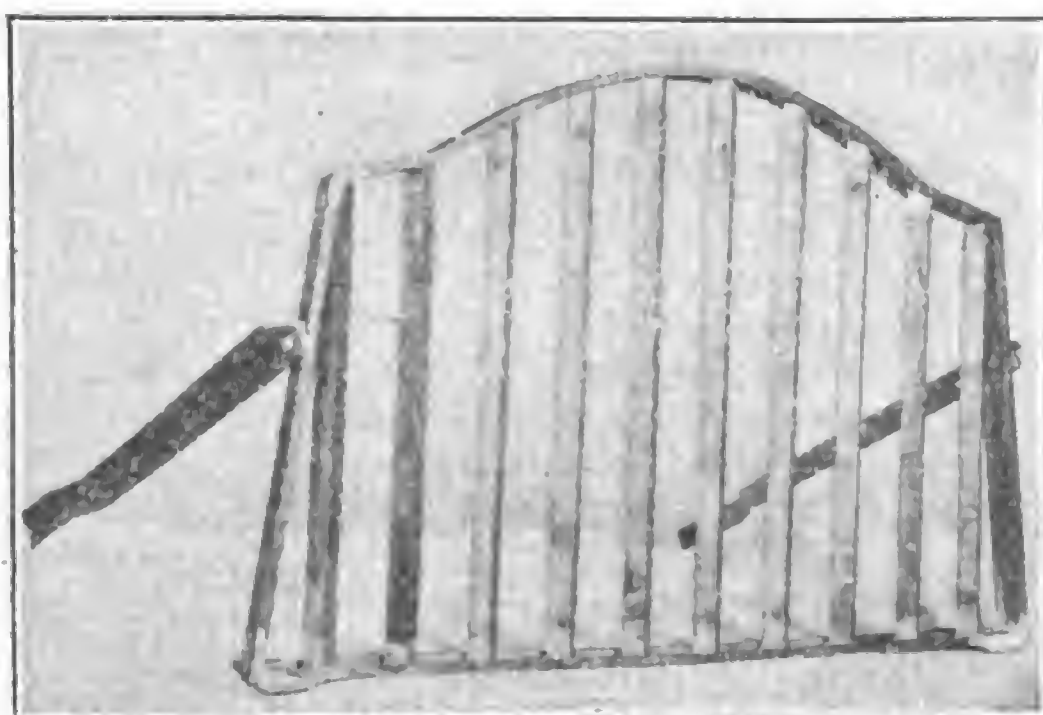
The Green Lock Co., Detroit, Mich., is manufacturing a Green Lock that is claimed to prevent thieves from stealing a car or truck to which it is attached.



The lock is clamped to one of the front tires, clamping around the spoke, and is fastened by a thief proof lock of rugged construction. The clamp is pointed at one end and if a vehicle is driven with the lock on, clear indication is given by the bumping of the tire on the road.

ALL-WELD RADIATOR GUARDS.

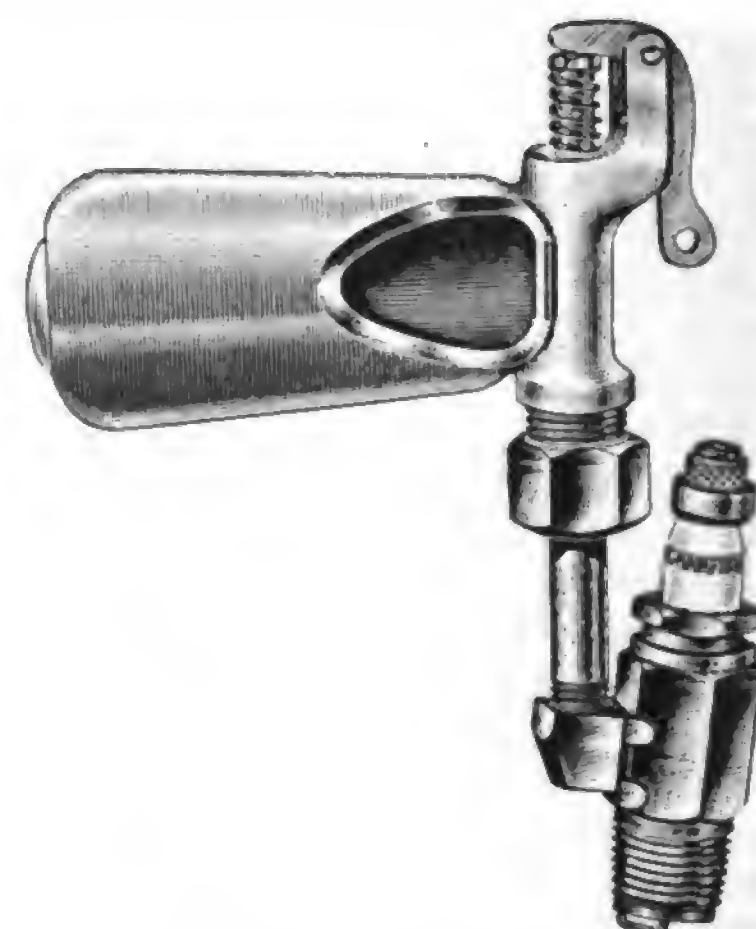
Michaels & Mourre, Inc., 344 Amsterdam avenue, New York, is showing a radiator guard that may be adapted to various trucks. Special guards are also manufactured on order to fit special trucks such as White, Packard, etc. The chief feature of the guards manufactured by the company is that all joints are welded and braced, making an unusually



strong guard which will protect the radiator and prevent damage in case of accidents. All kinds of automotive welding jobs are done by the company, including welds in aluminum, steel, cast iron and brass.

ILLINOIS NOPOWERLOSS EXPLOSION WHISTLE.

The Illinois Brass Manufacturing Co., Chicago, Ill., is manufacturing an explosion whistle for truck users that may be attached to a spark plug or pet cock opening of the engine and, by the pull-



ing of a string attached to the steering wheel gives a clear blast warning, which can be heard for quite a distance.

The whistle is made of aluminum and will not melt from heat, and when in operation no perceptible change in engine power or action of the engine is noticed.

STOP SIGNAL FOR TRUCKS.

The Protex Signal Co., Park building, Cleveland, O., announces the marketing of a new signal that may be used with satisfaction on a motor truck, warning the driver of a following vehicle of the intention of the truck operator to stop or slow down. The device is mounted on the left rear fender and when the brake pedal is pressed down a suitable warning light in the signal shows the word "Stop" distinctly on the signal glass. It is equally adapted for day or night driving.



NEW $\frac{3}{4}$ -TON CLYDESDALE-CLIPPER

A TRUCK which was shown for the first time at the Boston Automobile show, and which won the earnest attention of the purchasing public, was the new $\frac{3}{4}$ -ton worm drive Clydesdale-Clipper truck exhibited by the Clydesdale Motor Truck Co. of Clyde, O., through its distributor, the Holland System, Inc., 949 Commonwealth avenue, Boston, Mass.

Many new and novel features are incorporated in this truck, which are bound to appeal to discriminating buyers of commercial vehicles. Chief among these may be mentioned the heavy duty Hercules engine, fitted with Clydesdale controller, which acts similar to a governor, controlling the speed of the engine at the will of the operator from 10 to 35 miles per hour on high and allowing ample power for hill work.

Disteel wheels and cab are supplied with this job as regular equipment, while electric lights of unusual construction, fastened at each side of the radiator and at the rear, supply sufficient light for night driving. The engine is equipped with electric self-starter, and generator, while a storage battery of ample size provides for lights and starting, and is located in a convenient position under the seat.

Clydesdale-Clipper Amply Powered.

The engine of the new $\frac{3}{4}$ -ton Clydesdale-Clipper is powered by a heavy duty Hercules engine of the four-cylinder, four-cycle, L-head type, fitted with detachable heads. The engine develops 22.5 horsepower under S. A. E. rating and 32 horsepower under factory rating at 1600 revolutions per minute, with a piston displacement of 226.42 cubic inches. The engine is mounted on three-point suspension, two points at the rear and a single trunnion point at the front, which prevents torsional strains of the chassis from cramping or otherwise deflecting its driving position.

The cylinders are cast en bloc, with removable heads, of 20 per cent. semi-steel and the bore is $3\frac{3}{4}$ inches by stroke of $5\frac{1}{2}$ inches.

The crankshaft is a five-journal type, drop forged, from heat treated 45 per cent. carbon steel. The front bearing is $2\frac{1}{2}$ inches long, the second, third and fourth bearings $1\frac{1}{2}$ inches long, and the fifth or rear bearing $3\frac{3}{4}$ inches long.

The camshaft is made of carbon steel case hardened and ground and runs in three liberal size bronze bearings of $1\frac{1}{4}$ inches diameter.

The connecting rods are of I-beam construction, drop forged and heat treated, of 40 per cent. carbon steel, 11 inches in length and having bearings $2\frac{3}{16}$ inches in length by two inches in diameter.

The pistons are of 20 per cent. semi-steel, fitted with four rings $\frac{3}{16}$ inches wide. The valves have a clear opening in the throat of $1\frac{11}{16}$ inches, of the poppet type and made of alloy steel.

Lubrication is supplied by a circulating splash with gear pump drive operated from the camshaft. The spark plugs are $\frac{7}{8}$ inch S. A. E. standard.

The engine is equipped with regular float feed type carburetor, electric generator, starting motor and storage battery system, and a high-tension magneto supplies current for the ignition of the engine.

Cooling of the engine is accomplished by means of a large aluminum radiator having cast upper and lower tanks, while the core is fitted with straight copper tubes without fins, which is amply protected by guard bars and is supported on the chassis frame by spring suspension.

Transmission Four-Speed Type.

The clutch is a multiple dry disc type, while the transmission gearset is of the four-speed selective type, having four speeds forward and one reverse.

The transmission and clutch are in unit with the engine and both main and counter shafts are fitted with taper roller bearings. The gears are three-quarter inches wide. The drive is direct on third and over driven on fourth speed. The gear ratio of the first speed is 3.29 to one, second speed 1.61 to one, direct on third and fourth speed .787 to one. Reverse 3.94 to one. The gearset is equipped with power air pump driven from the power take off.

The rear axle is a worm driven, three-quarter floating type, fitted with tapered roller bearings. The final drive is through top worm and radius rods, which care for all rear axle strains relating to the chassis. The final rear axle reduction is standard, 5.6 to one. The front axle is a drop forged I beam, which is heat treated and fitted with tapered roller bearings.

The frame is made of pressed steel, $5\frac{1}{2}$ inches deep, $2\frac{3}{4}$ inches wide and $5/32$ inches thick, amply reinforced by heavy gusset plates and cross members.

Springs are semi-elliptic front and rear constructed of chrome vanadium steel, bushed at each end and fitted with oil cups. The front springs are 36 inches long and $2\frac{1}{2}$ inches wide.

The steering gear is located on the left side of the driver's cab, is of the worm and nut type, the wheel being 18 inches in diameter. The spark control and throttle are located under the wheel in a convenient position.

The gearshift and emergency brake levers are located at the driver's right and are operated by the right hand.

The wheels are regularly equipped with disteel type wheels and fitted with cord pneumatic truck tires, 35x5 inch front and rear.

The wheelbase of the truck is 136 inches and the tread standard, 56 inches, with a turning radius of six feet.

The equipment of the standard chassis includes steel cab, fitted with half doors, and windshield, electric starting and lighting, two-unit system with battery, electric head and tail lights, gasoline gauge, power air pump, speedometer, bumper, horn, tools and front fenders, full length running boards and extra wheel carrier.

Both service and emergency brakes are of the expanding type fitted to the rear wheel drums, and are 15 inches in diameter by $2\frac{1}{2}$ inches wide.

The load allowance is 1500 pounds, the body allowance 800 pounds and the chassis weight 3000 pounds.

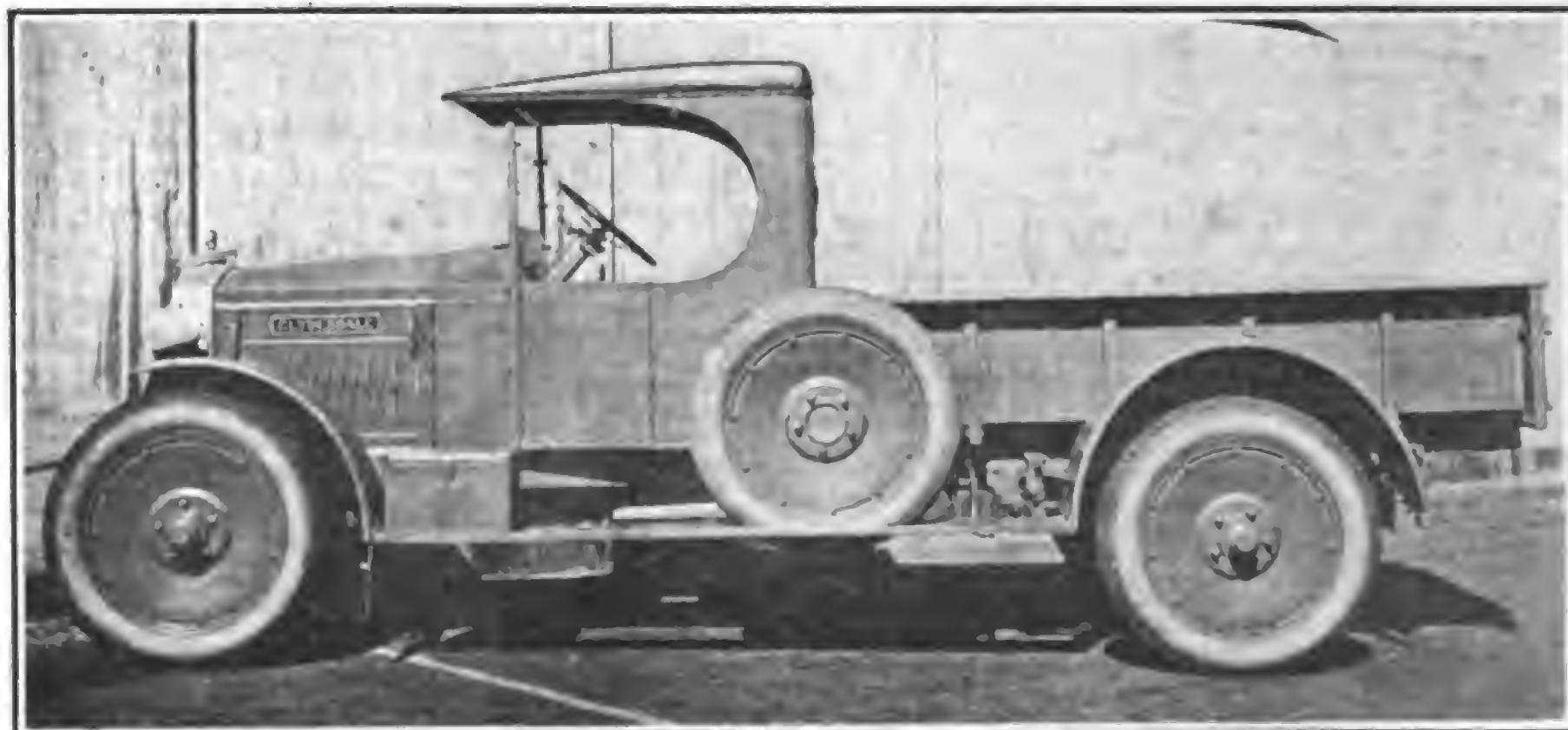
The gasoline tank has a capacity of 20 gallons, with the gasoline gauge located on the tank. The fuel is fed to the engine carburetor by vacuum from a Stewart vacuum tank located on the front of the dash under the engine hood.

The length of the loading platform back of the driver's cab is 92 inches and the height of the platform from the ground is 31 inches.

NEW PACKARD "AD" MANAGER.

James T. Aubrey, formerly with the Cosmopolitan magazine, has been appointed advertising manager for the Packard Motor Car Co., Buffalo, N. Y., and has already assumed his new duties. He has wide and valued experience in the advertising field.

An automobile show was held in the Second Field Artillery Armory, New York city, the week of April 3, when 103 passenger cars, 22 motor trucks and 85 accessories were on display. There was a large attendance and big interest in the event.



The $\frac{3}{4}$ -Ton Worm Drive Clydesdale-Clipper, Which Won Special Attention at the Boston Auto Show.

WHO'S WHO ON SALES FIRING LINE

WHITTAKER TO SALES MANAGERS' ASSOCIATION.

Don F. Whittaker has been elected executive secretary of the National Association of Motor Truck Sales Managers, and has assumed charge of the association affairs in its headquarters at 1157 Book building, Detroit.

Having been in the motor truck business for a good many years in his connections with the Federal Motor Truck Co., and at the Acason Motor Truck Co., Mr. Whittaker takes up his new work with a full knowledge of truck sales conditions, which will permit his giving the activities of the association considerable impetus along the lines which it has been following since its inception over two years ago. Mr. Whittaker was a charter member of the association and has been very active in its work during its existence.

Mr Homer Hilton, who has been managing director of the association, has announced his new connection as vice president and general sales manager of the Winther Motor Truck Co., which work he is taking up immediately.

The next director's meeting of the association will be held in their office in Detroit on March 25, at which time definite action will be taken toward the furthering of their plans for 1921 under Mr. Whittaker's jurisdiction.

U. S. MOTOR TRUCK CO. GETS L. J. KRAMER FOR SALES FORCE.

L. J. Kramer has joined the sales force of the United States Motor Truck Co., Cincinnati, O. Mr. Kramer has had extensive truck experience, having been connected with the Master Truck Co. since its organization. He was with Eugene Goldman, general manager and vice president of the U. S. Motor Truck Co., when Mr. Goldman was Republic distributor in Chicago.



L. J. Kramer, Veteran Salesman, Now With U. S. Motor Truck Co., Cincinnati, O.



"Spend a couple of car fares and come out to my house for dinner this evening. I'm too busy to waste any time on non-producers this morning," said O. M. Vett to me when I rung him up on the phone one day this week.

Landed at his trim little cottage home, with pretty accessories, early in the evening and found him still digging, this time in his garden. He opened his mouth just once to "hello" his guest and then went on and finished the job in hand, a practise of his.

"Kind of a new subject for me to harp on," he began, when he did open up, "although I guess I've unconsciously practised it for years."

He told about the boss sending him out to find why a certain dealer, who was reputed to be no great shucks as a talker, nothing wonderful as an executive and not remarkable in any way, had gone merrily along on the job during the lull and put it right over the crack dealers of the organization in turning trucks loose on the road.

"This man must have some secret that we don't know about, but which we need in our business," remarked the big chief.

O. M. Vett put in a day with the dealer and the simple secret of the man's success became an open book.

Violating all precepts of the trade he had an old blacksmith shop for a station, suggesting that his repair men already had a task on their hands. The dealer also defied the sartorial traditions of the craft, overalls being his every day equipment. He was always on the jump, but never too busy to be human, to help out a neighbor, to go to the telephone or to listen to any of the troubles to which mankind is heir.

He was uniformly polite and never forgetful of the fact that the truck business and the passenger car field are different lines and that the lad in the jumper may be able to buy a fleet of trucks where the fellow with side whiskers and the high collar could not pay cash for a toothpick.

This dealer does a steady, dependable business. He sells the same customers, time after time, regardless of what agency he takes on. His business is cumulative, because the old customers always come back and their satisfaction, voiced here and there, sends him new buyers.

"His secret was mental service, coupled with adequate mechanical service, and they are a pair to draw to every time," wound up the veteran salesman.

HELM BACK FROM EAST.

C. J. Helm, sales manager of the Acme Motor Truck Co., has returned from a trip through the East, where he presided at conferences of Acme distributors and dealers held in connection with the Boston, Philadelphia and Washington, D. C., automobile shows.

HYDE OF BUDA RESIGNS.

S. Gordon Hyde, advertising manager of the Buda Co., Harvey, Ill., has resigned and concluded his duties April 1. His future plans have not been announced.

DEGROAT WITH ACME.

W. E. DeGroat, formerly of the sales staff of the Timken Detroit Axle Co., is now with the Acme Motor Truck Co. of Cadillac in charge of dealer promotion work.

HILTON GOES TO WINTHER.

The Winther Motor Truck Co. of Kenosha, Wis., has announced the election of Homer Hilton as vice president and general sales manager and he has already assumed his duties in Kenosha.

Mr. Hilton is a well known figure in the motor truck industry, just relinquishing the duties of managing director of the National Association of Motor Truck Sales Managers of which organization he has been a director for some time past.

Previous to his direct management of the association affairs he was sales manager of the Oshkosh Motor Truck Manufacturing Co., of which company he was one of the organizers three years ago. He has also been connected with various other organizations in the automotive field. The energy and ability he displayed in directing the Sales Managers' association affairs should prove a potent asset for the Winther company.



Homer Hilton, New Vice President and General Sales Manager, Winther Motor Truck Co., Kenosha, Wis.

MOVE TO STANDARDIZE MOTOR HAULAGE RATES

A STEP that may prove important in the drive to standardize motor hauling rates has been taken by the Williams Shipping Agency, Inc., operating the Williams Terminal Dispatch, 24 Stone street, New York city, in filing with the Interstate Commerce Commission its tariff, like that of all common carriers. This concern uses 40 five-ton motor trucks. Operations are between Philadelphia, Pa., and Bridgeport, Conn., the Boston Post Road and the Lincoln Highway being used out of New York city.

The goods are insured in transit and are received, transported and delivered subject to the terms and conditions of the uniform bill of lading, which is the form of receipt issued by the carrier to the shipper.

The carrier also undertakes to render a C. O. D. service at varying rates based upon the value of the goods carried.

The carrier has followed the methods used by railroad and steamship carriers in that rates are stated in cents per hundred pounds and are quoted in connection with the official classification ratings provided in the current Consolidated Freight Classification.

The rates are based upon mileage and are grouped into four classes together with a minimum charge scale. This classification has been adopted because of the fact that truck loads are in quantities that move in L. C. L. lots by the railways. Rates quoted in the tariff are on a parity with those quoted by the railroads and steamship lines serving the same territory.

Aids in Co-Ordination.

Another reason for adopting the official classification is the intention to assist and coordinate highway transportation with other transportation agencies of the country in the solution of the terminal and short haul problem by the employment of sectional freight containers, whereby freight may be picked up at the factory or farm of the consignor and delivery made at the store or other place of business of the consignee with only one loading and unloading process. The use of motor trucks and demountable bodies, in connection with the railways, means the extension of same to shipper's or consignee's door, thus reducing transportation charges, elimination of unnecessary boxing, crating, dunnage, etc., as well as avoiding piling and accumulation of freight in city terminals.

Experience shows also that costs of gathering and distributing shipments, together with other terminal charges, have greatly increased, and that a terminal rate of from 15 cents to 20 cents per hundred weight, according to locality, is necessary to properly compensate the carrier.

Many shippers and consignees, however, possessing their own motor equipment prefer to make delivery to station or pick up their shipment from the delivering station.

In order to meet this condition the long distance service tariff has been made to apply only from station to station; and a separate tariff for local pick up and delivery is established.

For long distance traffic a rate of one (1) cent per hundred weight per mile, first class, according to distance traveled, is employed. Taking the first class rate at 100 per cent the following proportions have been applied for the other classes, viz.: second class, 85 per cent.; third class, 70 per cent, and fourth class, 60 per cent.

The practise of this carrier in publishing and filing with the Interstate Commerce Commission a complete schedule of its rates, rules and regulations is to be commended and shippers able to use the service advantageously should do so, in order that the service may be developed and other carriers be encouraged to proceed in a like manner to the mutual interest of all concerned.

The Rules for Service.

The service is operated under the following rules:

Rule 1 (a)—All articles will be charged at actual gross weight, and inserted in the bills of lading; except that when an estimated weight is given in the classification, such estimated weight will apply unless the actual weight is greater.

(b)—The estimated weights shown in the classification apply only on the articles named, and will not include dunnage used in connection therewith; dunnage being ratable at actual weight, and rates applying on the article shipped.

Rule 2—Any shipment which, in the judgment of the carrier, would not, at

forced sale, bring the amount of the freight charges, at destination, must be prepaid or guaranteed. Charges must be prepaid on shipments of second hand household goods.

Rule 3—Where not otherwise specified in the classification, any package containing articles of more than one class will be charged at the tariff rate for the highest class of article contained therein.

Rule 4—Any article exceeding in length, breadth or height the corresponding dimensions of the largest truck operated by the carrier is excluded from the classification, and will not be received for transportation.

Rule 5—Powder, high explosives, including dynamite, will not be accepted.

Rule 6—Packing requirements—Shipments must be prepared or packed in a manner to insure safe transportation, with ordinary care on the part of the carrier. Packages containing fragile articles, or articles consisting wholly or in part of glass, must be packed so as to insure safe transportation with ordinary care. If not so packed and plainly marked as to indicate the nature of the contents, the company shall not be liable for damages to such shipment, except when proved to be negligent. The agent of the carrier must not knowingly accept shipments not conforming to these requirements.

Rule 7—Shippers should express on bills of lading for shipments consigned "to order," their wishes in the matter of allowing inspection by consignee of property, at destination, before payment of charges and surrender of bills of lading. Unless notation is made that such in-

Williams Shipping Agency, Inc., Tariff Sheet

PHILADELPHIA, PA., to BRIDGEPORT, CONN.
Via Trenton, Newark and New York.

From Philadelphia, Pa. To Bridgeport, Conn.	Miles	Class Rates in Cents Per 100 Pounds.				
		1 Class	2 Class	3 Class	4 Class	Minimum
Bustleton N. J.	14	\$0.14	\$0.12	\$0.10	\$0.08	\$0.35
La Trappe N. J.	19	.19	.16	.13	.11	.35
Langhorne N. J.	24	.24	.20	.17	.14	.50
Fallsington N. J.	30	.30	.26	.21	.18	.50
Morrisville N. J.	33	.33	.28	.23	.20	.50
Trenton N. J.	34	.34	.29	.24	.20	.50
Mercerville N. J.	41	.41	.35	.29	.25	.50
Edinburgh N. J.	45	.45	.38	.32	.27	.60
Windsor N. J.	47	.47	.40	.33	.28	.70
Hightstown N. J.	51	.51	.43	.36	.31	.75
Cranberry N. J.	54	.54	.46	.38	.32	.75
Dayton N. J.	59	.59	.50	.41	.35	.75
New Brunswick N. J.	65	.65	.55	.46	.39	.75
Metuchen N. J.	70	.70	.60	.49	.42	.85
Rahway N. J.	77	.77	.65	.54	.46	.90
Elizabeth N. J.	83	.83	.71	.58	.50	1.00
Newark N. J.	88	.88	.75	.62	.53	1.10
Harrison N. J.	89	.89	.76	.61	.53	1.15
Jersey City N. J.	97	.97	.82	.68	.58	1.20
New York (42nd st.) N. Y.	100	1.00	.85	.70	.60	1.20
New Rochelle N. Y.	118	1.18	1.00	.83	.71	1.25
Mamaroneck N. Y.	122	1.22	1.04	.85	.73	1.25
Rye N. Y.	125	1.25	1.06	.88	.75	1.35
Port Chester N. Y.	127	1.27	1.08	.90	.76	1.40
Greenwich Conn.	130	1.30	1.11	.91	.78	1.40
Stamford Conn.	135	1.35	1.15	.95	.81	1.45
Norwalk Conn.	144	1.44	1.22	1.01	.86	1.45
Bridgeport Conn.	158	1.58	1.34	1.11	.95	1.50

A charge of 3 per cent. additional to above rates will be made for war tax, in accordance with the law.

spection may be allowed, it is assumed by the carrier that it is forbidden.

Rule 8—Carrier shall have the right to refuse to receive any freight offered for shipment which is likely to damage other freight.

Rule 9—Every package or piece of less-than-truck-load freight must be plainly marked with the name or initials of consignee. If "to order," full address of party to be notified must be shown.

When freight is consigned to a place not located on the line of the carrier's route, each package or piece must be marked with the name of the person on the route through whom the consignee will accept delivery.

Where it becomes necessary to transfer freight to connecting carriers, such shipments will be subject to the rules, regulations and charges of such connecting carrier.

Rule 10—Live stock, poultry, or articles of extraordinary value not handled. All claims for loss, damage or overcharge must be supported by the original bill of lading.

The Delaware state legislature has before it a bill which aims at the nation wide regulation of motor truck freight rates. It provides that the governor of that state ask the chief executives of all the other states to confer with him on the matter of general state regulation of motor hauling rates.

FWD PRICE DROPS.

After a thorough survey of existing conditions, meetings with FWD dealers all over the country, conferences with many large fleet owners and consultation with some of the best authorities in the country, the board of directors of the Four Wheel Drive Auto Co., Clintonville, Wis., passed a resolution, taking effect April 4, reducing the price of FWD trucks from \$4900 to \$4200, a reduction of \$700. "In making this reduction in price the company will sustain an actual material loss, but due to its excellent financial condition is in a position to sustain this loss," President W. A. Olen announces.

A bill in Michigan would increase the tax on trucks over 100 per cent.

FEES SAME FOR PASSENGER CARS AND TRUCKS IN SEVEN STATES

At the beginning of 1921 there were still seven states in which motor trucks were registered at the same rate as passenger cars, but in recent years there has been a very decided tendency in most states to increase the fees required for motor trucks over and above those required for passenger cars. This increase is usually based on the weight of the truck and its carrying capacity, its horsepower, or a combination of these factors. The most general practise seems to be towards definitely limiting the maximum total road weight of the vehicle and basing the registration fee on the capacity of the truck. Some few states have adopted a scale of fees, which in actual practise, serves to make the operation of very heavy trucks impracticable.

In Colorado, New Mexico and Oregon, in addition to the registration fees, a state tax on gasoline or other products used for the propulsion of motor vehicles is also levied. In some states motor cars are taxed as personal property in addition to the required registration fees. In Alabama, Delaware, Idaho, Iowa, Michigan, New Hampshire, New York, North Dakota, Oklahoma, Oregon, South Carolina, Pennsylvania, Tennessee and Vermont the registration fees are in lieu of all personal property taxes.

DIRECT PARTS SERVICE TOPIC AT MEETING APRIL 12

Parts makers and other interested parties have been invited to attend a meeting of the Motor Truck Manufacturers' association at the Detroit Athletic club, April 12, when the direct parts serving plan proposed by manufacturers of unit parts will be gone into thoroughly.

The truck manufacturers appear to be unanimously opposed to the servicing of parts, not so much on the ground of the immediate revenue losses as on the belief that this move is a blow at their in-

dustry, as it will ultimately result in the building of complete trucks by individuals and small concerns.

The makers of parts seem to be impressed with the justice of their contention that the move is warranted by conditions and it will take some threshing out to right the matter. It is felt, however, that some middle ground will be reached by which the ends of all the parties at interest may be served.

TRUCK A BUSINESS "AD."

The Goodrich Fruit Co. of Syracuse, N. Y., never overlooks an opportunity to advertise its business. In other words, they firmly believe in that well known slogan, "It pays to advertise." Consequently when they placed their order for a new one-ton Federal truck they included in the painting specifications instructions for attractive lettering on the body and on the disc wheels, which are standard equipped on the truck. To make the job still more attractive they specified nickel plated radiator guard and hubs.

According to the owners the truck never fails to attract attention and is one of their best advertisements.

CITY HAS FIVE SELDENS.

The city of Woonsocket, R. I., which purchased two Selden 1½-ton trucks for use by the highway department last year awarded a contract late in March of this year for three more Seldens, all of 3½ tons capacity. One of these is equipped with a 1200-gallon tank with gravity feed and will be used as a water sprinkler. The other two trucks are equipped with steel dump bodies. There were 11 bidders for the contract and although nearly half were under the Selden figure, the city officials decided in favor of the truck which had already demonstrated its utility.

LONG WHEELBASE GARFORD.

The Garford Motor Truck Co., Lima, O., announces that the 1¼-ton model 25 will be hereafter available with long wheelbase. This new chassis will have a wheelbase of 160 inches as compared with the 135-inch wheelbase of the standard chassis. Loading space of the long wheelbase model will be 147 inches as compared with 108-inch loading space of the standard chassis. The additional charge for the long wheelbase model is \$50 net extra.

ACME GETS SHAFFNER.

W. L. Shaffner, for the past nine years connected with the B. F. Goodrich Rubber Co. in various work throughout the country, and for the past five years in the manufacturers' division of the Detroit district, has resigned to become associated with the Acme Motor Truck Co., Cadillac, Mich. Mr. Shaffner will be in charge of the national account division for Acme, under the direction of C. J. Helm, sales manager.



Federal One-Ton Truck, One of Most Productive Advertisements Used by Goodrich Fruit Co. Syracuse, N. Y.

NEWS THAT SHOWS UPWARD TREND

TIRE BUSINESS BETTER.

More than 1000 men have been re-employed by the Firestone Tire and Rubber Co. during April. Production has been increased nearly 50 per cent. It has reached 15,000 tires a day, due, it is stated, to substantial increases in original equipment business from automobile factories which are beginning to resume work.

With the Goodyear Tire and Rubber Co.'s announcement that 1200 men would be re-employed during April, and with all other rubber companies reporting increased sales, it is expected that 5000 of Akron's idle factory workers will be back at work before May 1.

ONE TRIANGLE ORDER CALLS FOR 3750 TRUCKS.

The Triangle Motor Truck Co., St. Johns, Mich., should worry about the depression. This company has one order for 3750 trucks, 750 of which are to be delivered this year. This plant will have 150 men at work by the first of the month.

DUPLEX GOING STRONG.

The Duplex Truck Co. is operating on full time, although with a less than normal force. Production at this plant is in arrears on light trucks, but is up to demand in the case of the big four-wheel drive vehicles. It is said that the demand for the light weight "Limited" has increased steadily since the show season.

GENERAL MOTORS DIVIDENDS.

Directors of the General Motors Corporation on April 5 declared the regularly quarterly dividend of 25 cents per share on the common stock, and regular dividends on other outstanding issues.

TO DISTRIBUTE THE SUPER TRUCK NATIONALLY.

The O'Connell Motor Truck Co., Chicago, maker of the Super truck, has appointed Robert E. Page general sales manager. He has been with Hawkeye, Nelson and Dodge Bros. He is planning to immediately start work on perfecting a national sales organization.

I. H. TRUCK PLANT BUSY.

The International Harvester Co. plant at Springfield, O., is employing 1000 men and is turning out 50 trucks a day. These products are being shipped practically as fast as they are being manufactured.

FEDERAL ON FULL TIME.

The Federal Motor Truck Co., Detroit, Mich., has started on a full production schedule.

PICKING THE DEALER.

The distributor who is in the field for dealers today has a hard task. Hard in the sense that the choice brand is far from a glut on the market. The distributor should use as much care and judgment in selecting a dealer as he did in deciding on the make of truck he merchandises.

The Baker Motor Sales Co., Inc., Boston, Mass., New England distributor for the Selden truck, seems to have the right idea. This house recently sought a few dealers and inserted an "ad" in the newspapers, which named the towns where the sub-dealers were wanted and then continued:

"If you operate a service station in any of these places, want to sell and service Selden trucks—the Selden way—get in touch with us at once, provided you have and can show us these assets: Honesty, ability, dependability and a reputation for giving your customers a square deal in both sales and service."

AKRON ADVERTISING AGENCY IN OWN BUILDING.

Improved business conditions have made necessary several additions to the staff of the Akron Advertising Agency Co., with a resultant demand for larger quarters. In common with other leading agencies the company has accordingly taken a step ahead by acquiring its own building at 115 South Union street, in the residence section of Akron. The new quarters are particularly well adapted to the needs of the agency and to improve the service rendered its clients.

BIG OSHKOSH ORDER.

The Oshkosh Motor Truck Co., Oshkosh, Wis., is planning to start work on the second unit of its plant as the result of an order for \$4,000,000 worth of trucks and special fire fighting apparatus. This will require an output of 100 trucks a month. The company recently completed a \$250,000 plant.

M. A. M. A. SEES BUSINESS.

It was shown at a recent meeting of the Credit Department of the Motor and Accessory Manufacturers' association that business for March was better than for the two previous months combined and that indications are that April and May will go far ahead of March.

AUTO WORKERS RETURN.

In Detroit 25,671 workers were re-employed in automobile factories during March.

A TRAINLOAD OF REO'S.

As a result of retail orders taken at the Hartford show, Russell P. Taber, Inc., Reo distributor for central and eastern Connecticut, booked a solid train load of Reo cars and Speed Wagons for immediate delivery, in his small territory, comprising but six counties. The trucks and cars have arrived and have been delivered.

Reo dealers in the Hartford territory who attended the show were so impressed by the demand for both Reo passenger cars and Speed Wagons that they placed orders with Russell P. Taber, Inc., which took practically all of the surplus stock that had been secured to take care of the spring demand.

COMMERCE PLANT BUSY.

The Commerce Motor Car Co., Detroit, is nearing normal production and hopes to be going full tilt early in the coming month. An idea of the upward trend of business for this concern may be gleaned from the order of a representative just in from Ohio who had signed contracts for 13 trucks from Cleveland, nine from Columbus and six from Toledo.

BIG REO WORKING FORCE.

The Reo Motor Car Co. is employing 4500 men, or nearly the normal force. Of this number about one-third are working at full time, while the remainder are working at reduced hours. The sales department of the Reo company reports a big demand for the Speed Wagon.

GMC AGENT TO BUILD.

Automobile row in Toledo is to have another splendid building, the Owen & Graham Co. of Detroit, GMC distributor, having plans made to have its new structure ready Oct. 1. At that time this company will supply trucks to 12 counties of southern Michigan and northern Ohio.

ENGINE MAKERS ON MOVE.

The Wisconsin Motor Manufacturing Co., Milwaukee, manufacturer of the Wisconsin engine, is turning out more than 25 units a day and there are indications that the number will be largely increased at an early day.

SERVICE CAPITAL \$10,500,000.

Service Motor Truck Co., Wabash, Ind., has increased its preferred capital stock from \$2,000,000 to \$7,000,000; also increased its common capital stock from \$1,000,000 to \$3,500,000.

CONTINENTAL ACTIVE.

The Continental Motors Corporation, Detroit, is well beyond a 50 per cent. production basis and the gradual improvement in conditions continues.

Right Type of Tire Adds to Truck Utility

(By C. K. WHIDDEN, Manager, Truck Tire Sales, United States Tire Co.)

THE truck owner need not go far wrong today in selecting the correct type of tire for the vehicles in his fleet.

Each type of motor truck tire is designed and built for service under clearly prescribed conditions and by careful study of a few simple principles it will be possible to decide which type is the one suited to a particular purpose.

The limitations of service which each type gives are bounded generally by the capacity and speed of the truck and the character of the work the truck is called upon to perform.

Solid tires are for general use on trucks hauling loads of non-fragile materials under conditions that do not demand unusual speed, such as short trips in congested traffic where frequent stops are necessary, or on roads that are little affected by weather conditions. Such use is confined generally to large centers of population or between such centers connected by improved roads.

The industries that most use solid truck tires and the classes of work in which such trucks can be most economically used may be listed in general somewhat as follows: General manufacturing; general contracting and excavating; road building; coal and ice retail delivery; lumber retail delivery; packing and flour milling industries; city delivery for wholesale grocers; terminal freight hauling; transfer work in cities and oil and gasoline deliveries in cities.

Solid tires as to type and use are of three kinds—regular, high size and large single. Each is designed according to a certain principle and is built with a view to a certain class of service.

The regular tire is the conventional solid truck tire. It is built to meet conditions that are not exceptional and for that reason follows standard conventional lines. Solid truck tires of this type are most economical and satisfactory for all ordinary trucking purposes where medium sized trucks are used and where prescribed loads and speeds are fairly closely adhered to. The field for the regular tire in the industries listed above is, with certain exceptions, on the front and rear wheels of trucks of 1½ ton capacity and on front wheels of trucks above the 1½-ton class, except as noted hereafter. Circumstances and requirements may arise under which trucks of the classes mentioned may be operated more economically on other types of tires, such circumstances as regularly hauling heavy loads over very rough pavements or making long distance trips and trips over country roads. Under these circumstances it may be preferable to use either the high size solid tire or pneumatic truck tires. Such conditions are exceptions to the general rule and



C. K. Whidden, Manager, Truck Tire Sales, U. S. Tire Co.

must be so dealt with.

High Size Type of Solids.

There are certain circumstances and conditions of truck hauling which warrant the use of the high size type of solid tire. This differs from the regular tire in that it furnishes greater tire height and cross sectional area, therefore greater cushioning; allows somewhat greater load carrying capacity; gives greater mileage; retains vitality longer and allows less vibration in the truck.

The high size tire costs more and therefore should be recommended only for such uses as will bring a return in proportion to the extra money invested.

The high size truck tire can be used most economically on the front wheels of all trucks above the 1½-ton capacity operating under the general conditions heretofore enumerated, but where in addition the following requirements are important: (1) A demand for cushioning effect not as great as that furnished by pneumatics, but greater than supplied by regular tires, for example, where a solid truck tire is compelled to run regularly over rough city pavements; (2) whenever it is expedient to carry occasional heavy loads, such as large pieces of machinery; (3) where the user wishes to obtain greater mileage from his solid tires with longer time between periods of replacement; (4) where trucks are operated at long distances from tire application facilities, such as in isolated rural districts; (5) to improve the steering qualities on heavy duty trucks.

When to Use Single Type.

The big single type of solid truck tire has for its best example the mono-twin,

which is designed and built to take the place on rear wheels of dual solids, whether high size or regular. The field for this tire is at present on the rear wheels of trucks of capacity above 1½ tons, requiring a tire of seven inches to 14 inches in width. It takes the place of cushion tires and cushion wheels, carries a heavier load than dual tires of the same cross sectional width and maintains this carrying capacity as well as all other features, undiminished throughout its tire life.

The development and perfection of the pneumatic truck tire—the type of pneumatic that is built especially for trucks and is not merely an enlarged passenger car type—stands out as one of the greatest steps in truck evolution. There is now no question but that its place is established for use on all trucks up to and including two-ton capacity where the elements of traction, speed and cushioning are especially needed in truck operation.

The swing to large pneumatics has been so rapid that many mistakes have been made in marketing them. This company believes that sizes above eight inch have not yet been developed beyond the experimental stage.

Pneumatics Economical.

Pneumatic truck tires may be used economically on the front and rear wheels of trucks of capacities up to and including two tons, and on the front wheels of trucks above the two-ton capacity, operating in the following classes of haulage work: General farming; dairy, egg and chicken industries; bottling industry; furniture manufacturers and dealers; wholesale produce dealers; department stores; fire trucks of light and medium types; rural transfer companies; rural distribution of gasoline and oil and inter-city single desk passenger busses.

Pneumatic truck tires have come into use in helping to solve transportation problems more extensively in the Middle West than in the Middle Atlantic or New England states. The reason is one of road conditions coupled with the fact that smaller capacity pneumatic tire trucks are most useful and economical in farm territory. As an industrial class the farmer is probably the largest user of the pneumatic tire truck. As in farming, so in the other lines of work mentioned, pneumatic truck tires have come into use on lighter trucks because their use is economically sound. Furniture dealers use pneumatics to save breakage, produce dealers to save their fruit and vegetables, bus operators to give speed and comfort, other industries to save time and secure traction.

Pneumatics Not Cure-Alls.

Pneumatic truck tires are not cure-alls for general transportation evils and

should be recommended for use only under circumstances and operating conditions where the higher initial cost will be offset by economies resulting from cushioning, speed and superior traction.

The following table summarizes the proper size and style of tire to be recommended for use on trucks of various capacities. The tire sizes listed approximate those prescribed as original factory equipment for trucks of the respective capacities by truck manufacturers.

The listed sizes also conform to the load carrying requirements of the different capacity trucks. In using this table the nature of the work the truck is to perform is the factor that should determine for the user the proper tire to be used if more than one tire is listed for the same capacity truck. Preceding classifications of truck uses should be utilized in determining this factor.

It must be borne in mind that the classifications respecting industrial uses of truck tires given are very general. Under present conditions of roads, truck design, traffic and load limitations, hard and fast tire requirements cannot be laid down without the knowledge of conditions under which the vehicle will operate. Pneumatic tired trucks can be linked up with solid tired trucks in the same business, and by the intelligent use of both classes of equipment the transportation work as a whole speeded up. The tire for the job is here shown.

How Your Trucks Should Be Tired

Truck Capacity in Tons.....		¾	1	1½	2	2½	3	3½	5	7½
		Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
Regular Tire	Front .....	.....	.....	3½	4	4	5	5	6	7
	Rear .....	.....	.....	5	.....	.....	.....	.....	.....	.....
High Size Tire	Front .....	.....	.....	.....	4	4	5	5	6	7
	Rear .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Large Single Tire	Front .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Rear .....	.....	.....	.....	7	7	8	10	12	14
Pneumatic Truck Tire	Front .....	.....	4½	6	6	6	7	7	7	8
	Rear	5	5	7	8	.....	.....	.....	.....	.....

TORQUE IN TRUCK AND TRACTOR ENGINE

The sale of a motor truck or tractor depends upon what power it will develop at slow engine speeds and how it will perform under difficult conditions. Heavy duty engine manufacturers are mindful of this feature when designing engines for truck and tractor service and design an engine having high torque at low speeds.

The ability of the engine to lug its load at low speeds is a factor which tends for economy of operation, long life to the engine, and better work in the field and on the road, allowing the truck or tractor to perform its work under conditions which would be prohibitive with ordinary types of passenger car engines that operate at high speeds.

The power plant of a truck or tractor is the most important part of the vehicle, for without a satisfactory engine all other parts would be useless. There are many factors which determine the value of an engine for use as a truck or tractor power plant. One of the most important is the quality known as torque.

Torque is a factor of almost negligible quantity in the efficiency of engines used in passenger cars because of the high speed at which the engine operates. The power impulses from the gas explosions in the cylinders are so close together in point of time as to be practically continuous, thereby making the horsepower almost a continuous flow.

But to the purchaser of a truck or tractor, torque is a factor which he cannot afford to overlook. Trucks and tractors must operate under severe loads at medium and low speeds, often for long periods of time. Under these conditions there is a greater length of time between the successive power impulses the flow of horsepower being thus interrupted.

Torque, the ability to pull to the last turn, varies radically with different engines and at various speeds. Many factors enter into and determine the torque of an engine, such as length of stroke, valve sizes, cam action, scavenging of gases, lubrication, vibration, etc.

It is at once apparent that in order to obtain the proper torque for any engine, each and every one of these factors must be considered and each part properly designed, not only for the particular purpose for which it is intended, but in correlation to all other parts.

An examination of the power and torque charts issued by manufacturers of heavy duty engines indicates that the engines have been designed so that the torque curve approximates very closely the theoretical ideal of a straight line. The torque, or turning effort, is almost the same at the lowest maximum safe speed as at the highest, a condition which is of utmost importance in the efficient operation of a truck or tractor.

supervisor of the Boston district for Maxwell-Chalmers. Both men are well known in their respective territories and bring to the dealers in these districts a thorough knowledge of all phases of the wholesale and retail sales field.

HANDLING SELDENS IN TEXAS.

The Selden Truck Corporation, Rochester, N. Y., has appointed C. V. Reser as division sales manager in the Texas territory. Mr. Reser is a proven Selden man.

A. E. A. CONVENTION JUNE 20.

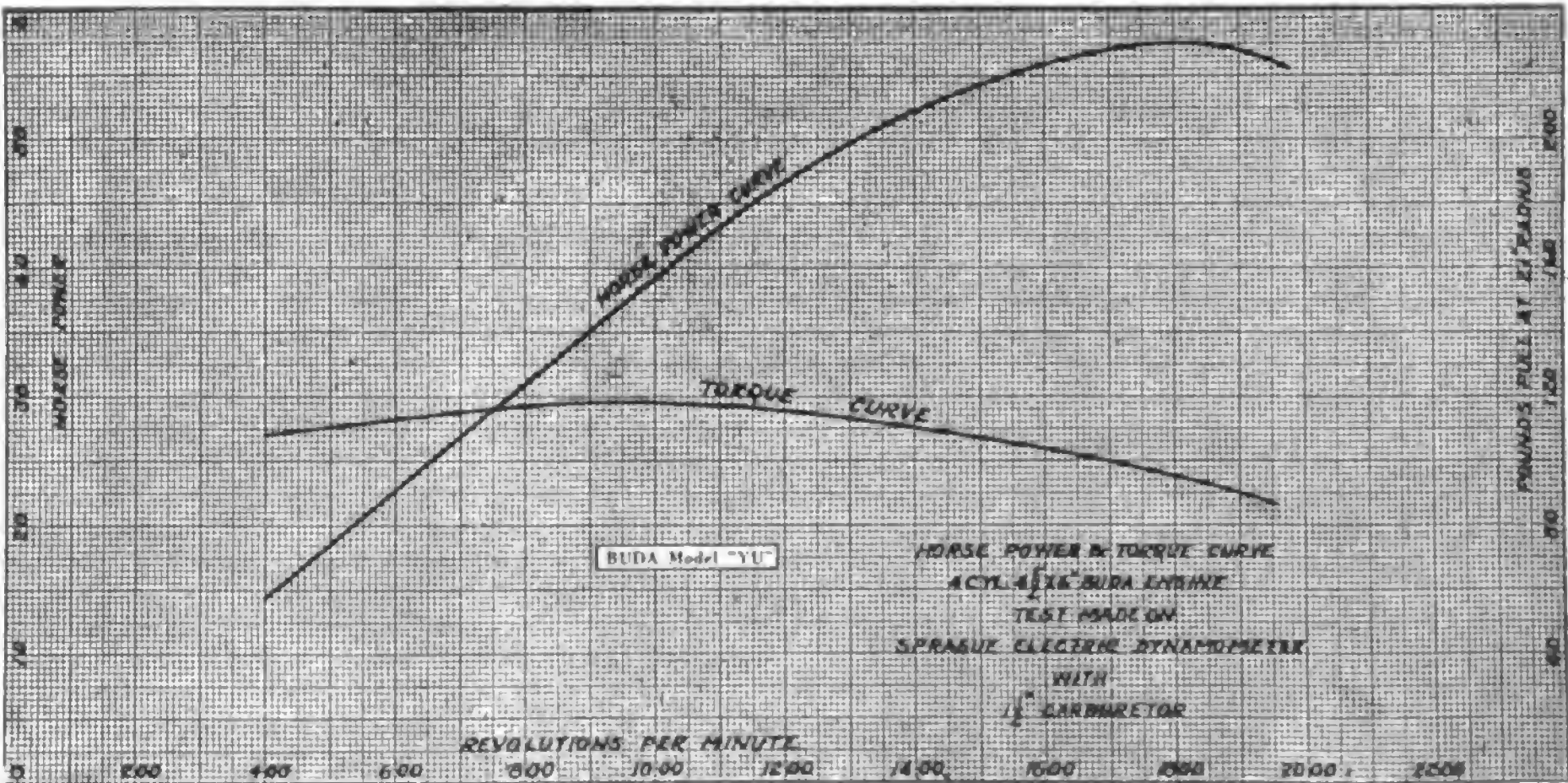
The Automotive Equipment Association convention will be held at the Grand hotel, Mackinac Island, Mich., the week of June 20. Plans are being made to conclude the business by Friday night.

GMC STOCKHOLDERS MEET.

The annual meeting of the stockholders of the General Motors Corporation will be held at Wilmington, Del., April 20.

MAXWELL SUPERVISION.

B. F. Page, formerly manager of the truck department of the Maxwell Motor Sales Corporation, has been appointed supervisor in charge of the Omaha district for Maxwell-Chalmers, and S. W. Munroe, who was for several years in charge of the New England district for the Maxwell Motor Co., Inc., is appointed



The Highest Torque in a Heavy Duty Engine Is Reached Between 800 to 1000 Revolutions Per Minute, Dropping Gradually as the Engine Speed Is Increased.

FIRST MEETING OF THE OLD TIMERS' CLUB DIRECTORS

"Good laws, good roads, good fellowship," the slogan of the Old Timers' club, was formally adopted at the first meeting of the board of directors. This meeting was held at Flint, Mich., April 2-3, when all but three of the directors were present. At this meeting there were added to the directorate W. C. Rands of the Motor Products Co., who will be treasurer of the organization; Harvey S. Firestone of the Firestone Tire & Rubber Co., vice president of the tire section; Amos G. Batchelder, chairman of the executive committee, and secretary of the American Automobile association, vice president of the Good Roads and Highway section. The directors shown in the accompanying cut are:

Front row, left to right, W. C. Rands, Motor Products Co., treasurer Wm. L. Hughson, San Francisco, Los Angeles, Portland, Oakland, San Diego, Seattle, vice president, Distributors' Section; Albert Champion, president Champion Ignition Co., Flint; Gregory Flynn, vice president Jobbers' section, vice president Edward A. Cassidy Co., New York; Lloyd Maxwell, Erwin, Wasey & Co., Chicago, vice president advertising section.

Second row, left to right, John Younger, Standard Parts Co., Cleveland, vice president Parts and Accessory section; F. Ed. Spooner of the Detroit Motor Times, vice president and advertising manager Motor West, secretary; Richard Kennerdell, chairman Contest Board A. A. A., vice president Contest section; Walter Birmingham, automobile editor Evening Post, Chicago, vice president Newspaper section; W. S. Gilbreath, manager Detroit Automobile club, chairman Constitution and By-Laws Committee; C. G. Sinsabaugh, editor Motor Life, vice president Automobile section; Mar-

tin L. Pulcher, Federal Motor Truck Co., vice president Trucks and Tractor division.

Directors absent—Alfred Reeves, general manager National Automobile Chamber of Commerce, vice president Organization section; Thomas J. Hay, automobile distributor Chicago, vice president Dealers' section; Howard Marmon, Nordyke & Marmon Co., Indianapolis, Passenger Car and Airplane section; Harvey J. Firestone, Firestone Tire & Rubber Co., Akron, O., vice president Tire section; A. G. Batchelder, chairman Executive Committee, American Automobile association, vice president Good Roads and Highway section; J. Ed. Schipper, technical editor Class Journal Co., chairman Membership Committee.

FIGHTING BAY STATE FEES.

Several hundred truck owners were present at a March meeting at the Massachusetts state house to protest against a sizable increase in registration fees. It was shown that motorists had paid 103 per cent. of the cost of construction of state highways and 140 per cent. of the maintenance cost. A protest from 5000 motorists was presented.

The argument of the representatives of the automobile industry and automobile owners generally was that highway expenditures should be paid for by taxing the entire citizenship of the state. Another proposal was that bonds be issued to take care of the expense of such work, and still another was that betterment assessments be levied upon persons whose property may be enhanced in value by reason of the construction of new state highways.

The Motor Truck club of Massachusetts was the chief factor in getting out the big attendance and conducting the fight against the excessive fees proposed.

Secretary Joseph F. Dineen was on the job every minute and had all the members working.

TRAFFIC COMMITTEES IN CHAMBERS OF COMMERCE

The National Automobile Chamber of Commerce, through its Motor Truck committee, has launched a campaign for the establishment of transportation committees in Chambers of Commerce throughout the country. It is urged that this will prove one of the best and most profitable steps ever undertaken by any business organization. It will help to eliminate wasteful methods of distribution, cut down cost of handling and develop markets. Even should transportation facilities be ample they are wasted unless properly correlated and the industrial fabric suffers thereby. This committee could also be a factor in mobilizing the truck transportation resources of the country for use in public service in times of need.

The Motor Truck committee's announcement says in part:

"Every Chamber of Commerce throughout the land should have a transportation committee. The personnel of this committee should be drawn from local merchants, manufacturers and farmers. It should have a first class traffic manager and a farm secretary, and should work closely with the local carriers and motor truck lines and operators.

"The duties of the committee would be to study railroad freight car supply and movements, tonnage awaiting shipment, to or from your community, future or potential tonnage, etc.

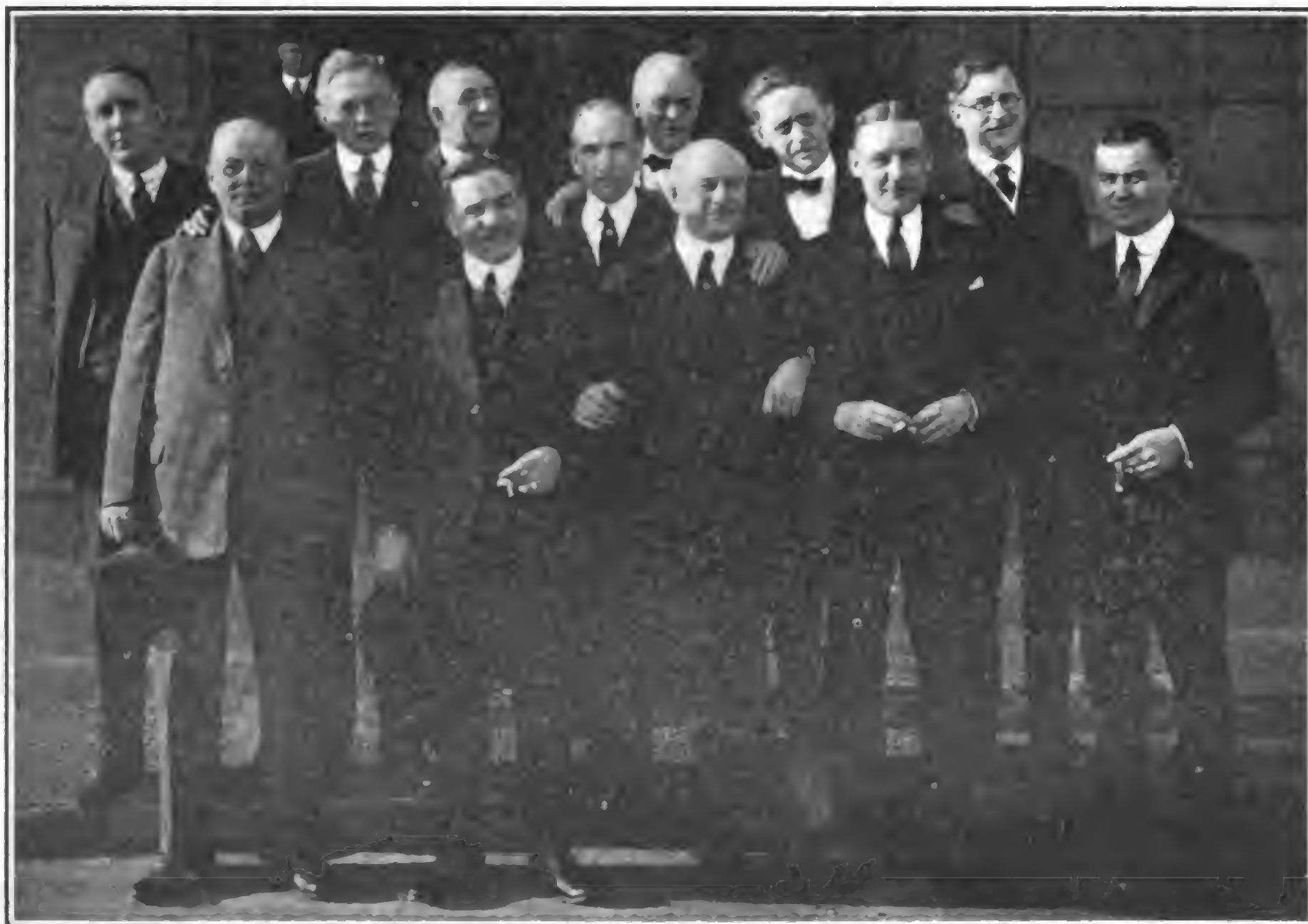
"The St. Louis Chamber of Commerce employs an expert or specialist who is constantly working among the farmers and county agents for the purpose of making agricultural production profitable. The duties of the farm secretary would be to encourage greater production of farm products, inaugurate proper operation of motor transport lines between farm and city and to create a ready market for these products at consuming centers.

"The committee, through its staff, should therefore compile and determine rate to be charged by motor truck operators, such rates to be made standard and based on the cost of operation, netting the operator a fair return and setting a minimum standard rate which the farmer and the city user of the transportation is to pay."

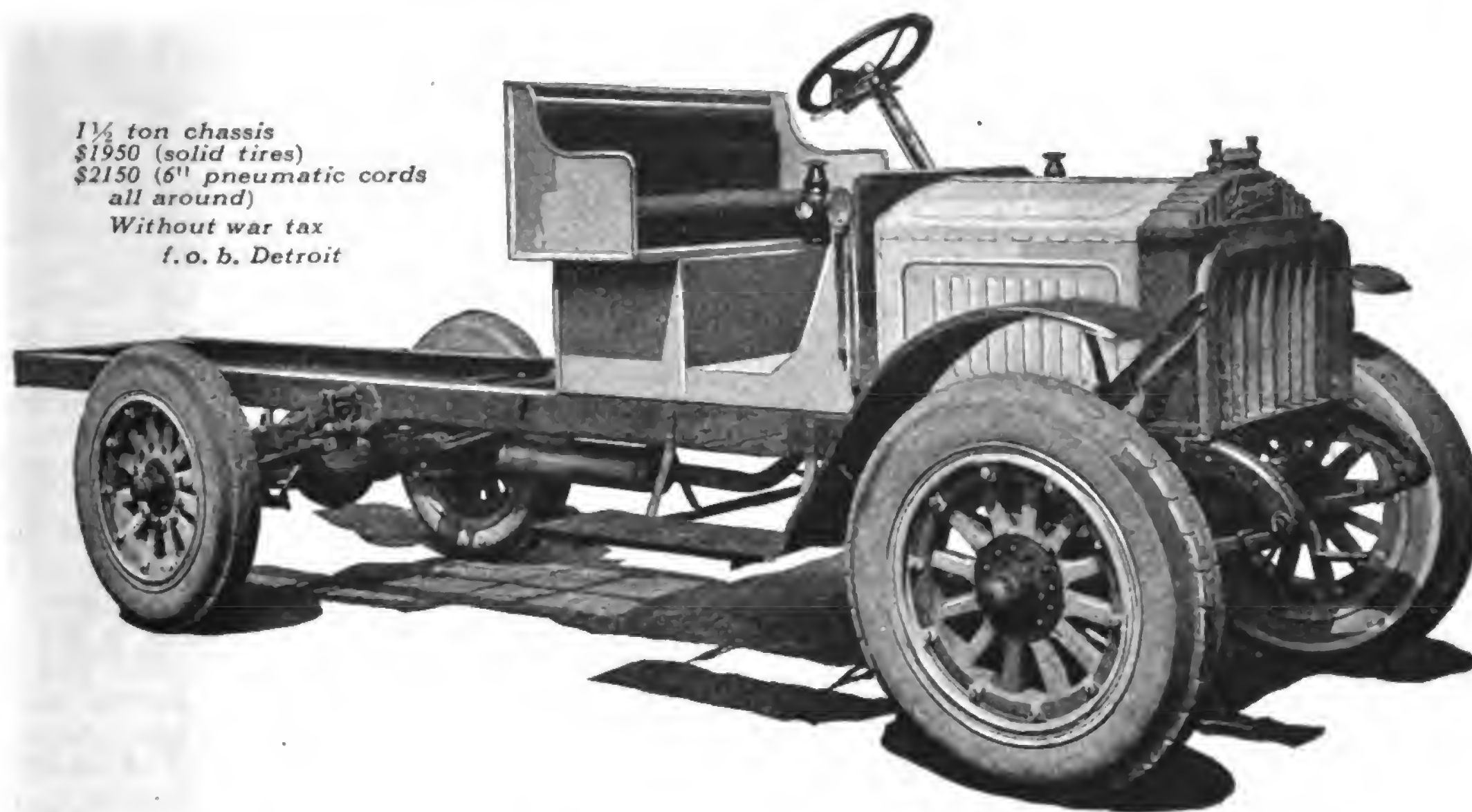
TRUCK DRIVEAWAYS.

Truck manufacturers in Michigan have been taking advantage of the open roads in driving trucks overland. From the Acme Motor Truck Co. at Cadillac driveaways have been frequently staged south to Grand Rapids, Detroit and other points.

Tuesday, March 29, a fleet of four trucks, consisting of three two-ton gravel dump jobs and a 1½-ton chassis were driven through to Grand Rapids by the McGurkin Sales Agency, 1121 Division avenue, South, Grand Rapids, Mich., Acme distributors at Grand Rapids.



Directors of the Old Timers' Club in April Meeting at Flint, Mich.



1 1/2 ton chassis
\$1950 (solid tires)
\$2150 (6" pneumatic cords
all around)
Without war tax
f. o. b. Detroit

Only \$1950

For the *Standard* 1 1/2 Ton Chassis

Some of the Standard Units Used in This Model

Continental Motor Model
N, 3 3/4" x 5".

Timken Front and Rear
Axles and Bearings.

Spicer Universal Joints
and Propeller Shafts.

Eisemann Magneto.

Stromberg Carburetor.

Brown-Lipe Transmission,
Clutch and Control.

Perfection Springs.

Long Spiral Tube Cast
Tank Radiator.

Ross Steering Gear.

AT this price the Standard 1 1/2 ton (pay load capacity) worm drive truck represents the greatest value in the motor truck world today.

Made by experienced and long established truck manufacturers who use only standard nationally known units in its construction the Standard one and a half ton truck at the low figure of \$1950 (solid tires) or \$2150 (6 in. pneumatic cords all around) is by far the most unusual offering ever made. That it will receive a wonderful reception at the hands of the buying public is a foregone conclusion. Our dealers everywhere are preparing for a great rush of business on this model.

We have a few territories open and have a good proposition to offer to live dealers. If you are interested write or wire to-day.

STANDARD MOTOR TRUCK CO., Detroit, Mich.

Standard MOTOR TRUCKS

Registered
DETROIT
USA

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

HEIL BODIES, TANKS AND HOISTS

The Heil Co., Milwaukee, Wis., has designed a welded gravity dump body for contractor's use in road construction. The company has applied for patents on this special type of body and intends to manufacture them in quantity during the coming year.

The body is constructed of steel, electrically welded at all seams and joints, making a body which is water tight and capable of handling wet concrete. The second important feature is that the operating device is very simple. The control which holds the body in place consists of self-locking hooks, held in place by springs. The control handle for operating these locking hooks can be easily reached from the driver's seat without getting out of the cab.

The third very important feature of the Heil dumping body is that the body tips or rolls over backward on pivots, which prevent it from getting out of line. Instead of using control chains, two bars or rods are attached to a cross member, which connects the longitudinal parts to the sub-frame. Into these are placed coiled springs, which keep the body firmly in place when in the raised position. The springs allow the body to roll over easily when loaded and keep it from rattling when empty.

Gravity bodies are built in various sizes ranging from $\frac{3}{4}$ of a yard to $1\frac{1}{2}$ yards in capacity, and they may be used on trucks ranging from $\frac{3}{4}$ to two tons or more.

The price of the one yard body to contractors is \$100 f. o. b.

Many other lines of work will suggest themselves to owners of Heil gravity dump bodies, as they may be used equally as well for hauling coal, gravel, sand and other building material.

Users of motor vehicles who have installed Heil equipment state that in heavy trucking work where body and hoist equipment receive unusually rough usage the Heil products fill the bill.

A feature which appeals to truck users when equipping trucks with the Heil hoist is the fact that the body can be placed close to the cab, an advantage which allows greater loading space and gives unusually good load distribution. This factor is especially desirable when using short wheel base trucks in road contracting work. This feature also allows free access to the transmission for oiling and replacement of the parts, which is a time and labor saver.

The Hydro Hoist of Simple Construction.

The Heil Hydro Hoist shown on the miniature truck in the illustration, in connection with the combination body, is one-third actual size and clearly illustrates its operation and location.

The hoists are made in four sizes, and so designed that there is a suitable size to fit practically every truck on the market. Numbers 4, 5 and 6 hoists consist of two cylinders each, while No. 7 is fitted with only one cylinder, this hoist being designed particularly for trucks equipped with the propeller shaft mounted at the side.

The hoist is mounted on the chassis frame just in front of the rear axle and about in line with the front of the rear spring hanger.

Power is taken from the front propeller shaft of transmission amidship and is applied directly to the pump drive by means of a shaft and universal joints.

There are only a few working parts to the Hydro hoist and the simplicity of its construction makes its operation very easy, while the parts are readily accessible for inspection. The location of the hoist is such that it does not interfere with the accessibility of the truck units, such as the transmission gearset and brake linkage.

The control lever for operating both the valve lever and sliding gear of the unit power plant clutch is located in the cab usually with the gear shift lever. The hoist can be easily drained when necessary by simply removing pipe plugs in the bottom of the cylinders.

Lifting Power of the Heil Hoist.

The lifting power of the Heil hoist is practically unlimited, as the action of



Heil End Dump Bodies Are Hinged to Rear of Truck Frame, Fitting Slant of Frame and Are Locked in Loaded Position by Hook Brackets Riveted to Frame and Movable Bar on Front End of Body. No Chains Used to Prevent Body Tipping Too Far.

the hoist is direct and no power is lost. Each hoist before leaving the factory is tested to more than double the maximum amount of its rated load, assuring the purchaser that it will perform satisfactorily in his chosen work.

Hoist No. 4 is adapted for use in three-ton trucks, has two cylinders of $4\frac{3}{4}$ -inch bore, will lift 350 pounds per square inch and is tested under a lifting force of 12,400 pounds.

Hoist No. 5 is adapted for use on $3\frac{1}{2}$ to $5\frac{1}{2}$ ton jobs, has two cylinders with bores of $5\frac{3}{4}$ inches, will lift 400 pounds per square inch and is tested to 23,400 pounds.

Hoist No. 6 is adapted for use in six to 10-ton trucks, is equipped with two cylinders having seven-inch bores, will lift 450 pounds per square inch and is tested at 34,650 pounds.

Hoist No. 7 is equipped with one cylinder having a bore of seven inches, will lift 350 pounds per square inch, is tested at 13,475 pounds and is intended for use on three-ton jobs, fitted with side propeller shaft.

Nearly every Hydro hoist will give a dumping angle of 45 degrees. The improved design makes it possible to dump an unevenly distributed load with one rear wheel lower than the other, as the tendency of the body to twist is reduced to a minimum through the construction and method of operating the hoist. The suspension of the hoist on the chassis frame does not interfere with the flexibility of the chassis, nor does it interfere with the ground clearance of the truck. All use of cables, pipes and pulleys are eliminated in the construction, which reduces its weight. All parts are standardized and are interchangeable.

Heavy engine oil is used for the operation of the hoist, the oil being forced into the cylinders by means of a gear pump, which is located in the manifold between the cylinders, and acts on the bottom of the pistons, forcing the pistons upward, raising the body. As the piston reaches the top of its stroke the oil supply to the pump is shut off, holding the body in the raised position. To lower the body a valve, located at the rear of the cylinders, is opened which permits the pressure of the oil to be released and flow back into the cylinders, allowing the body to descend at a moderate rate as fast as the oil is released.

Combination Bodies Have Many Uses.

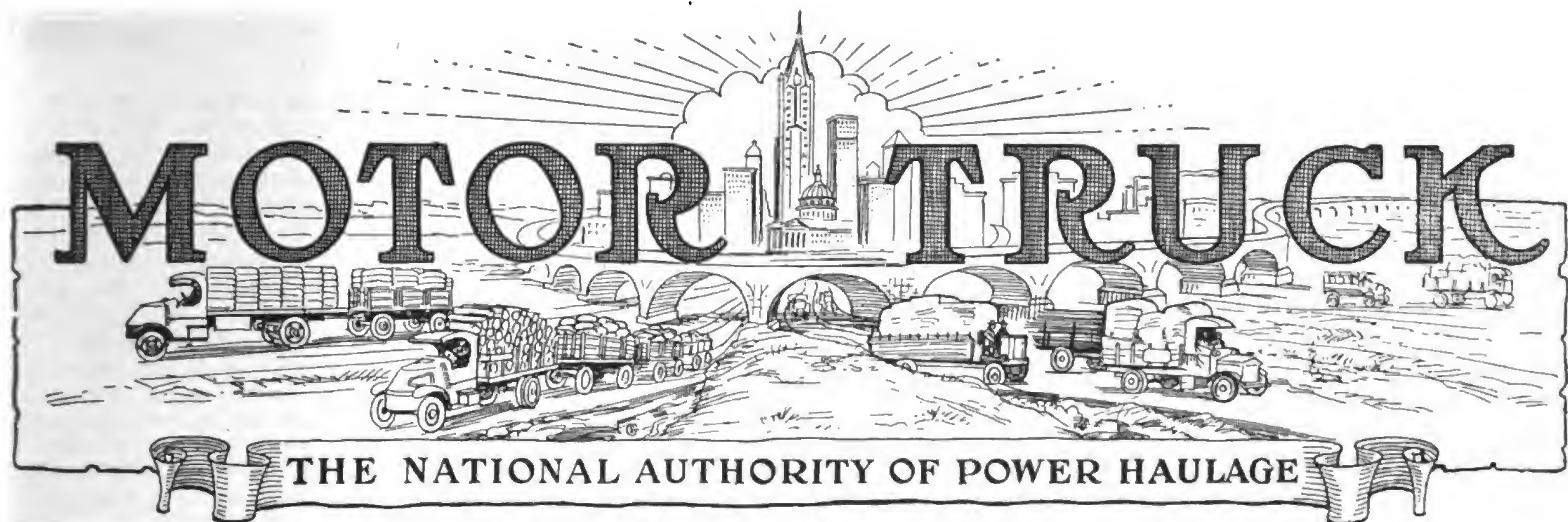
The combination type of body, manufactured by the Heil company, may be adapted to many commercial vehicle uses. The sides are readily removed, giving a platform type equipped with stationary front end gate and rear hinged gate, or the sides may be used, giving a body which may be used to advantage for hauling merchandise, coal, gravel, etc.

In the four-in-one body two sets of removable sides are provided which have been found especially useful in bag coal delivery where it is necessary to unload part of the load from the side of the truck. The three-in-one body is fitted with high removable sides and is especially designed for building supply dealers. The sides are constructed high enough to give the required capacity for sand, gravel or crushed stone.

Standard dump bodies, designed with stationary steel sides and end gate, are also available in standard widths of $4\frac{1}{2}$ to six feet and lengths nine to $12\frac{1}{2}$ feet. All bodies are constructed three inches wider at the rear than at the front to allow for easy dumping of loads.

Other special bodies constructed for special commercial truck work include asphalt bodies for handling hot asphalt, special coal bodies fitted with high sides, garbage bodies having all joints hot riveted and the seams electrically welded, forming a water tight body and special compartment tank bodies for handling gasoline, oils and other liquids, which are constructed semi-rectangular or elliptical, as desired by the purchaser.

The New Jersey Legislature has adopted a bill basing the fees for trucks on capacity. The smallest fee is \$10.



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A BIG BUSINESS FOR BIG MEN

MOTOR TRUCK INDUSTRY OFFERS GREAT OPPORTUNITIES
AND PROMISES SUBSTANTIAL RETURNS FOR PROGRESSIVE
AND PERSISTENT ENDEAVOR

(By S. G. SWIFT.)

THE prize pessimist of the world is he who worries about the future of the motor truck industry. Such a person could easily bring himself to the point of worrying about the possibilities of a permanent slump in the use of food. People will always eat and they will always buy commercial vehicles. The "luxury" market can never become absolutely stabilized, but there will always be a demand for necessities. Precedent and common sense assure the truth of the foregoing and by so doing guarantee the future of the truck industry.

The truck with its various accessories is an actual necessity and there is no question about its future. All classes of purchasers buy the truck in exactly the same manner that they would purchase so much transportation and

SALESMAN? OR ORDER TAKER? WHICH ARE YOU?

The truths of salesmanship have been so often exploited that the writer, who fondly imagines that he can add something of worth to that which has already been said, finds himself uttering common platitudes, regardless of how he may think or write. Everything that may be thought of has already been written a hundred times, and that which is really true appears trite, and through repetition seems almost puerile. But is that any reason why it shouldn't bear repeating again? Certainly not.

At this particular time, when things are starting to boom, the industry calls for real salesmanship as never before, and the following is written not so much as a lesson in salesmanship, but more as a review that will make the wide awake salesman polish up his selling armor.

Look each subject over carefully and see if your selling machinery is functioning properly after the years of easy business. You'll need perfect coordination of all working parts for the season that is just starting up. "There is no man so good that a little study won't make him better."

KNOWLEDGE—The salesman who succeeds knows the product he represents. He **MUST** if he is to tell others about it. The **MORE** knowledge he has, the **MORE** he can impart to others. This is the first principle of salesmanship. **CLEVERNESS** cannot take the place of **KNOWLEDGE**.

APPEARANCE—Be well groomed at all times. This does not mean "dolled-up." The first attracts—the second repels. A good appearance enhances personality. Personality creates confidence.

SINCERITY—Sell yourself. You can sell others only by the sincerity with which you cry your wares. The purchaser must believe what you say. How can he do this if you haven't a well founded belief in what you sell? Sell yourself 100 per cent. Then stay sold regardless of what happens.

ARGUMENTS—Don't have them. They arouse antagonism and delay sales by taking the prospect's attention away from the point at issue.

EXAGGERATION—If you are representing an article that won't stand the truth—get another job. Exaggeration may sell once. It gets no repeat orders. Furthermore—it cheapens you. Why employ the aid of exaggeration when truth does the job better? Don't overlook this—it's important.

PROMISES—The customer in buying from you has taken you at your word. He believes in you. That's frequently the reason he has purchased. Therefore, if you make promises that you can't keep—he won't buy again—at least not so easily. Make few promises as possible and keep those you make.

OPTIMISM—Be as optimistic as circumstances warrant, but don't be foolishly over-optimistic. If you can't be optimistic **DON'T** be pessimistic nor allow your prospect to be. Get his mind away from "hard times" by interesting him in your proposition.

WORDS—Don't use big words. They don't impress anyone and it occasionally happens that you may use an unfamiliar one wrongly. Express your thoughts in concise, clear English.

DON'T KNOCK—"Order takers" are apt to knock for the simple reason that they have no other method of combating competition. The true salesman never does. He sells his own goods and lets the other fellow sell his.

Be **DIPLOMATIC** and **COURTEOUS** at all times and **WORK**.

know beyond a shadow of doubt that the machine pays substantial dividends on the money invested.

The retailing of trucks and accessories is a big business for big men and one in which any big man may well feel proud to be engaged. Such men realize that the larger the field the greater is the opportunity, and there surely is no one industry in this country today that offers better promise of substantial return.

Everyone realizes that there has been a period of reorganization, but that does not signify permanent stagnation by any means, and a careful survey of the situation as it is today shows that there never has been a better time for the progressive man to get into the business than right now.

This is made logical by the fact that there are more than 1,000,000

trucks in the United States today that are in active use. Many of these machines have been run for years and the replacement business alone will amount to a tremendous sum, to say nothing of new installations that will also bulk large.

Future Market Is Unlimited in Possibilities of Development.

The potential market of the future offers possibilities that are well-nigh unlimited. It shows that every business man in the United States is a prospect for the sale of a truck, and the greatest factor is the child of today who will be the buyer of tomorrow. He is already sold on the proposition and will not, like his parents, have to be weaned from the horse drawn vehicle.

The present user of the truck had to be sold away from other forms of transportation. This in itself constituted strong sales resistance, but added to this was the fact that for many years at the start of the industry the mechanical principle of the machine was far from right. Now all this is changed. The present day truck is as near perfect as the most critical could desire. All of which makes the future sales possibilities of the business greater than almost any other that might be mentioned.

Selling Trucks Not a "Game"

The truck business is a modern merchandising proposition. It is not a "game." The use of the word is odious and suggests the hazardous chance. This might have applied at one time, but that time has passed. The business is now a dignified industry and a mighty fine one, too. Let's think of it that way and forget about the time when it was perhaps rightly characterized as a "game." That's water over the dam, thanks to the development of recent years.

Some substantial business men who would be a credit to the industry have hesitated to go into the retail end of it because of their lack of mechanical knowledge. This idea is rank fallacy. It is analogous to saying that a man could never sell bricks with any success because he had never worked in a brick yard.

To be sure it is desirable for the proprietor of a sales and service station to know the business in all its phases, but it is far from necessary that he know the actual mechanics of the truck he sells, and this fact is proven by the many successful retailers who have never learned anything specific about the mechanical end of the machine except such as has been gained through intimate association with the work from day to day.

The best truck salesman that the writer knows was for many years the foreman of the small tool department in a large factory. He made nearly \$12,000 in 1920. The most successful dealer that can be called to mind at the moment is a man who conducted an undertaking establishment from the time he was 23 until he entered the truck business at the age of 46. This man shared \$48,000 with a partner last year, which wasn't bad on an investment not much larger than the profits of the one year. And there are thousands of dealers who better that figure.

Fundamentals for Success.

Progressive merchandising policies coupled with genuine business ability and salesmanship are the only essentials aside from a proper amount of capital that the retail truck and accessory business man needs, and the merchandiser who starts with these fundamentals will be bound to succeed. He can't help it. The truck business is responsive to proper treatment, and many will succeed in it who might find it hard sledding in other lines of endeavor. This last is being proven every day.

The truly big business man with a fair amount of capital, or ways in which to raise that capital, will have almost no trouble in connecting as an agent with a desirable manufacturer. There is always an opening for a new agency, and the manufacturer is ever willing to co-operate with reliable men who desire to

THE TRUCK DEALER'S 10 COMMANDMENTS.

The essentials of successful truck selling may be found in the following tabloid form:

1. Training
2. Responsibility
3. Understanding
4. Courtesy
5. Knowledge
6. Service
7. Ability
8. Logic
9. Enthusiasm
10. System

sell his product. In former years it would have been a wise man who thoroughly looked up the manufacturer offering the agency as to his reliability before planning to tie up with him. At the present time there is practically no danger of making a bad connection, as nearly all trucks manufactured today are right mechanically in every way. To be sure, the well known truck that is properly advertised has great advantages from a sales viewpoint, but there are few manufacturers doing business that have not the financial strength necessary to back up their product, and very few products that are not satisfactory.

Amount of Commission Varies.

The amount of commission to the dealer varies somewhat. Frequently this is 20 per cent. and there are many manufacturers who have adopted this as a flat rate. It naturally follows that the better a vehicle is known the smaller will be the commission, as sales will be more easily made than would be the case with one that was not well advertised. If a truck is little known the dealer must spend a certain amount of his commission in missionary work, and as a result must get a larger commission than as though he were handling a better known product.

The local dealer of course is expected to finance and maintain his own estab-

lishment, which may consist of merely a salesroom, but which, to be right, should include a service station, as the service station that functions properly is the greatest single asset of the successful truck dealer. The real service station, using the word in its fullest sense, does more for the good health of the retailer than any other one thing. It is truly a "silent salesman" and the best one that the dealer can have on his staff.

The writer has in mind a small town where there are two service stations. One of these has an ornate brownstone front, a large expanse of plate glass and all the modern improvements. It is everything that a service station should be from an architectural standpoint, but unfortunately it doesn't merit its name, as it gives almost no service.

The other service station is located in what used to be an old foundry. The smoke of ages has stained the interior, the windows have never been washed within the memory of the oldest inhabitant and the wooden building has a dirt floor. But it is a service station in everything that the word means and the man who owns it sold, during a period of 18 months, just seven times as many trucks as did the other dealer or, to speak literally, the service this man gave sold the cars.

Actual Service Should Be Given.

It doesn't make so much difference what sort of a looking service station the dealer has, although this is important. The point is that he should give actual service. Too many dealers have treated customers as though they were never to see them again after the first sale and thus, by their short-sightedness, have actually destroyed the foundation of their future market.

Without seeming to criticize unduly, it almost seems as though anyone could go into certain territories and by the simple expedient of giving service and telling the truth build up a business in almost no time and with little capital. The unscrupulous retail dealer has hurt the business far more than has the unscrupulous manufacturer.

There are many persons who believe that the time is soon coming when trucks will be serviced in much the same manner as are typewriters, adding machines and cash registers, and this is perhaps a true forecast, although the question is divided about equally, as others think that all service will eventually be done away with. This phase of the business will adjust itself. At the present time service is absolutely necessary if one is to do a fair quota of business.

Intensive Advertising a Factor in Success.

All national advertising is of course done by the manufacturer and frequently the local advertising as well, although this last is usually paid for as the result of some agreement between the agent and the factory. In practically every case the advertising copy or layout is furnished by the manufacturer and this means a lot, as the skilled advertising writer can usually set forth the superior points of the truck in a manner that is productive of results.

The dealer may be able to make a deal with the manufacturer whereby he agrees to allow a certain amount of money for local advertising proportionate to the number of machines sold, and in any event, even though the dealer should be called on to pay for his own advertisements and to write them as well, he should not neglect to keep the people of his territory informed at all times regarding the product he sells. This can only be accomplished in a satisfactory manner through advertising.

All things being equal, a man should locate his agency in his own home town. He knows the people there and probably has their confidence, which is a big factor in the successful retailing of the truck. If the agency contemplated is to be situated in another city the prospective dealer should visit that territory and carefully survey conditions there. "Anything worth doing at all is worth doing right," and this expression, trite though it may be, applies aptly to locating the truck agency.

Many a man has paid too little attention to this important part of the business and has gone ahead and contracted for territory without properly ascertaining the extent of his probable market, with the result that having gone into the thing too heavily and too hastily, he has lost his investment.

Dealer May Sell Several Makes of Trucks.

A dealer may handle a number of makes of trucks, or he may feel that he can do better work if he confines his attention to a single make. This matter may perhaps be best determined by the dealer before he enters the business, or he can start with some one popular make, provided he can get it and then add others if he feels that conditions warrant. Many of the more successful agencies handle one low priced truck and one high priced one, though there seems to be no set rule to go by and one must be governed wholly by conditions in his territory.

It all depends on the territory and unless one plans to start in business in his home town he should carefully survey his proposed field of operations before signing any contracts.

It is advisable to select the highest quality truck having the price to fit the greatest number of prospective purchasers in the territory in which it is to be sold, and it may be that conditions will warrant the successful representation of two or three different makes.

The greatest market from the standpoint of volume is for trucks selling below \$2000 or \$2500. This applies to urban as well as agricultural territory, although there is a proportionate demand in the cities for the high priced vehicle as well.

Truck sales depend largely on the demand and perhaps the most popular size truck sold is the 1½-ton, although facts carefully compiled by the statistical department of MOTOR TRUCK, the authoritative magazine on motor haulage, show that different conditions prevail in different territories and this feature will have to be determined almost wholly by local dictates.

Dealer Must Not Contract for Too Much Territory.

The old way of grabbing all the territory that could be obtained by a single dealer is rapidly giving way to the idea that the small territory exhaustively worked is better. It is much more satisfactory for the dealer to take on a small territory and carefully comb it, than to contract for a large territory and a correspondingly large quota of cars and have more on his hands than he can get rid of. It has been demonstrated time and again that few large territories are carefully worked, by the fact that good salesmen have come in from other territories, knowing nobody who was a prospect and have been able to make sales to persons whom the dealer had never thought of as buyers.

Location of Sales Room Is Important.

The location of the sales room and service station is nearly as important a factor in the ultimate success of the business as is the choice of the car to be handled. This point should be determined as far as possible by the make and quality of the car that is to be sold, the location being in keeping with the class of trade that will be the logical buyer of the car, although this does not apply so much to the truck end of the business.

If the dealer is handling a high priced car he should have a location that will be such that persons buying the car will be willing to visit it, and it is highly desirable to have an up-to-date building with proper surroundings.

In handling a low priced car one does not have to be too particular as to location and many successful dealers in low priced machines are located in rather undesirable quarters, but it stands to reason that the better the location is the better will be the sales possibilities. In this respect and especially with regard to the interior arrangement of the service station, it will be worth the while of the dealer to visit other agencies to get advantage of ideas that have been worked out in practise.

The sales room should be bright and sunny, with large, full length windows, which will permit the observer to see the car from the sidewalk. A corner location is ideal for efficient service, as it permits of a side entrance to the service station without going through the front entrance to the building, although any location can be attractively arranged if a little thought is given to laying it out.

Organization Should Be Carefully Chosen.

The first step in building up an organization should be to select the man who is to assist the owner. This man should be honest and loyal and should know the automobile and truck business in all its phases. His knowledge of the business should be valuable in guarding against the selection of undesirable salesmen and mechanics.

Enthusiasm is an absolute necessity in truck distribution, and the most successful assistant manager will be he who is enthusiastic over his proposition. He must not only "be sold" on the business as a whole, but must also have a genuine liking for the machines that he is selling. He must

like to meet people and should have certain innate qualities that will enable him to get along with all classes of trade. And this applies as well to the salesmen who will work under his direction.

The expert mechanic costs more money to hire than the one who has only a limited knowledge of the business. In the end, however, he costs less, and experience has amply proven that there is no such thing as a "cheap mechanic," except as one might use the term in referring to the class of work that such a man does. The best is none too good in this case and the successful dealer will bear witness to the truth of the assertion.

All employees should be trained to follow modern business methods, and the one feature that must be insisted on is courtesy. The person entering the salesroom should be met by a pleasant, courteous salesman, even though the salesman knows that he is not a prospect. One of the most important assets of any business is the telephone operator. This is a fact on which too much stress cannot be laid.

The unpleasant, raucous voiced operator has done more to drive away trade than the average person realizes. The telephone has been called the "front door" of the selling establishment. Stop and think what that means and insist that your telephone be promptly and courteously answered by one who has been thoroughly impressed with the importance of courteous telephone service as a distinct attribute to successful business.

The employees of the sales and service station should reflect the policies, and to an extent the characteristics of the owner, and this means that the grouchy individual will have only himself to blame if his leadership is followed to the extent that his helpers are discourteous and unenthusiastic. Enthusiasm and courtesy play an important part in the running of the sales and service station, as also does the owner's appreciation of those who, having always the best interests of the business at heart, do the very best work they possibly can.

The Pay of the Salesman.

The tendency at the present time seems to be somewhat directed toward paying a salesman by some means other than straight commission. Stipulated salaries have been tried out by some dealers, but the plan most approved of seems to be a combination of salary and commission and this phase of the business will have to be worked out by the dealer himself.

Commission salesmen when business is especially good will perhaps turn in a large amount of good business. The tendency, however, of workers of this class is to slight the really hard buyer and to concentrate on the "cream" of the trade. These men perhaps cannot be blamed for passing up the "tough prospects" as they feel that they are spending their own time and money to little effect. This hurts the dealer's business and is an argument for paying salaries to salesmen. The salaried man will go where he is sent and the eventual result will be more customers. The commission man handling either automobiles or trucks all too frequently sells machines through

rank misrepresentation, and this is especially true in the distribution of trucks. This type of salesman, feeling that he is in the business to get all he can out of it, may excuse his methods, but they have done much to harm the legitimate business such as is done by the salaried man.

One dealer of the writer's acquaintance who has been unusually successful says that he is done with commission salesmen. He figures that he will be ahead of the usual record of profit by hiring good salesmen and paying them a fair salary. In a conversation recently he told of one salesman in his employ who made nearly \$9000 last year. Others working in the same territory made anywhere from \$4000 to \$7500, while a vast majority of the 24 men who "worked" for him hardly made a living. This man plans to hire three or four good men, pay them around \$50 weekly with expenses, and feels that he will be the gainer in the end. He has rather pronounced views on the subject and intimated that "the good commission salesman makes too much, while the inferior one does nothing much except spoil prospects for some one else," and in the experience of the writer his statement is logical.

Regardless of the manner by which the new dealer pays his men, there is one thing he must insist on if he is to build on a firm foundation, and that is that the prospective buyer be told the exact truth. The New York dealer who inserted an advertisement in a daily paper not long ago may have had this in mind, for his copy read:

"Wanted—Three Motor Truck Salesmen Who Can Tell the Truth for Nine Hours Daily," etc.

The dealer must realize that every clean sale he makes is a substantial asset to the future good health of his business. It means a customer sold for all time, and one who, when he is again in the market, will buy from the same dealer without solicitation. The eventual result of a clientele of satisfied customers must be obvious to the thinking dealer, who must also realize what a dissatisfied "clientele" will mean, especially if he keeps on adding to this latter class. The one spells success, the other failure. There's no secret about that.

Good Cost System Essential.

A good cost system is one of the essentials that the dealer who is about to start in business must have in order to properly determine costs, to use them for a basis of determining charges and to analyze and compare them so that he will know almost exactly on what basis he is operating. The efficient cost system will also aid in making more intelligent statements to the bank and in obtaining a larger line of credit, and this latter fact is especially true.

A cost system will not run itself; neither will it save a man from failure, but it will show him where he stands from day to day, which cannot but aid in the success of the venture.

Of somewhat similar import is the keeping run of overhead charges, which include expense of operating building, insurance, power, light and heat, and general depreciation. The latter item is one of the most important expenses, as it is usually large, and the dealer who slights it is fooling himself, just as is the man who figures the total costs of operating his truck and accepts them as final without taking the depreciation into consideration.

Good common sense advertising is one of the greatest sales helps that a dealer can have. The writer has always realized and appreciated this and has recently had it called to his attention in a striking manner by the case of a truck dealer of his acquaintance. This man had a fine service station and a good reputation. All through the recent period of depression his business was fair, but not as good as he thought it should be and in an endeavor to stimulate buying he used a three-inch, double-column display advertisement three times a week in his local paper. This advertisement was simply a plain statement of conservative facts in which the dealer's telephone number was set forth in rather large type. Two days after starting to advertise he began to receive telephone calls from people he had never thought of as prospects, and his sales immediately showed a marked increase, thus demonstrating beyond a shadow of doubt the feasibility of advertising to stimulate a dull market.

No Time for "Knocking."

The thoroughbred truck salesman will put his whole energy into selling his own car, and will have no time to knock one that is handled by a rival. It is unfortunate that the once abandoned idea of knocking the other fellow's product seems to have come back within the last year or two. One sees a tendency among advertisers to claim that they have the "best" regardless of whether they have any actual right for so characterizing their product. It is needless to say that this doubtful sort of salesmanship is "boys' play," and puts the prospective buyer in a frame of mind that oftentimes keeps him from buying at all and, in any event, delays the sale. It invites argument, and many times makes the prospect mad. He claims to know as much about trucks as the average salesman and, whether he does or not it is poor policy to insult whatever intelligence he has. Salesmanship should be constructive rather than destructive, and the thoroughbred salesman knows this. He tells what he knows that is good about his truck, not what he knows that is bad about the other fellow's and by so doing shows that he has learned the secret of successful constructive salesmanship—and it certainly is a secret to many.

Much might be written about this subject of relative estimates, but aside from the ethical fact the salesman should keep away from comparisons simply because such methods actually lose and delay sales—and sales are what he is concerned with. He can find arguments in his spare time.

TRUCKS VS. MULES.

"The light, fast motor truck has put a very serious crimp in the Missouri mule market," says W. G. Thompson, president of the Thomart Motor Co., Kent, O. "There are more than 5000 mules for sale in St. Louis and Kansas City, Missouri's two greatest mule markets, where rent and feed are expensive. The mules have been virtually 'eating their heads off' since last July. They are a drug on the market, and the dealers owning them have been waiting for buyers, but can't even get a bid. The stagnation in the trade in mules is almost without precedent. However, it shows that the farmers are beginning to realize that upkeep is a most important question, and the cost of feeding any mule, whether he is employed or idle, is not relished by any farmer with an eye to profits.

"Any recent traveler throughout the great farming centers of the country cannot help but be astonished at the immense number of speed trucks he finds in the highways and at work in the fields. They are quite effectively dispossessing the mule of a field that was once his almost exclusively. The advantages of motor trucks are particularly emphasized in times like these, when there is idle time cropping up now and then."



Four-Wheel-Drive Transports Material and Men Daily Over Steam Road Bed Four Miles in Length.

TRAVELLING DE LUXE.

The adaptability of the motor truck to operate on railroad tracks has made the four-mile ride of 35 men employed by the Cresson Consolidated Mining Co. to and from the mines as comfortable as riding in a Pullman. The motor truck, a three-ton FWD, which formerly was run over rough roads, has been equipped with flanged wheels and is now carrying its passengers in real comfort over the smooth steel rails that lead to the mines. Even the driver has protection from the elements in an all-weather cab. The accompanying cut shows that the truck does not always haul human freight.

SERVICE FOR DUPLEX.

The Stephens Motor Co., Oklahoma City, Okla., distributors for the Briscoe, Mitchell and Duplex trucks, is now located in its former home, 315 North Broadway, where there will be sales and service for all lines handled. Fred R. Hoffman is in charge of service, Bert L. Russell is in charge of sales and Earl M. Stapleton is manager.

Participating in Progress

The Motor Truck industry, already assuming proportions of great magnitude, is actually only in the embryonic stage of its development, and the average person, so used to the many forward steps occasioned by modern inventive genius has perhaps become somewhat indifferent to the part which the motor truck is destined to play in the future freight transportation of the world.

Already, though only a few years have passed since its inception—with poor highway conditions to contend with, and the vicissitudes of mechanical experiment attendant on all new things—it has almost displaced the railroads for certain classes of haulage and one realizes that with better roadways and the assured evolution of engineering principles, the power hauler must eventually displace all other forms of land freight carriers in exactly the same manner that the great ocean freight steamers have relegated the sailing vessel to the yesterday of time. This fact is guaranteed and authenticated by precedent and must eventually obtain.

We are living in what is distinctly an era of efficiency in doing material things, and specifically—thanks to the motor truck—an age of better transportation, and the thinking man must realize that the power vehicle as a cargo carrier is one of the epoch making inventions that will wholly change the future work of the world.

One frequently hears the opinion advanced that the motor truck is not actually an invention, but rather the adaption of an already discovered principle. This is puerile discussion and not worthy of consideration. The same thing might as truthfully be said of any other invention to an extent at least. Neither is it relevant to discuss just what unit will power the vehicle of the future. Many engineers theorize in detail the reason why the motor truck will eventually be driven by steam. Others claim that electricity will furnish the necessary propelling force, while there is yet another school of profound thinkers who argue for the virtues of gasoline as a basic source of power. This end of the affair will adjust itself and can safely be trusted to the future.

The main issue is the fact that the motor truck is making history and every one who is aiding and benefiting in its development should have a proper feeling of pride at the opportunity given him to be an integral part of a great movement that is doing something that will benefit present and future generations.

Right now is the time for us all to get busy in developing the present sales market of the power hauler. The opportunity is here. Business long dormant has revived. Good times are with us again with all that the phrase implies. This is the best chance we have had in years to jump into the work of popularizing the motor truck.

Pleasant and interesting work it is, because it not only admits us to a share in the rich material gain that is sure to come with properly developed effort, but it also gives us a place in the promotion of what is perhaps the greatest forward step along industrial lines that the present generation will see. The industry is worthy of fair treatment and will repay every effort in its behalf with dividends of unreckonable worth.



MOTOR TRUCK SAVES BROCKTON ICE CROP

(By A. B. SHERMAN, Plymouth County, Mass., Distributor, Acme Trucks.)

THE trick was done in two days. Just in the nick of time, as it turned out. The next day the weather moderated, and if Mr. Cushman had depended upon horses, as he has heretofore done, and as most everybody else does, he would have lost practically his entire crop.

Mr. Cushman is the proud owner of one-ton Acme truck 3435. He purchased it July 8, 1919, through the S. & F. Motor Sales Co., Plymouth county distributors. Mr. Cushman is pretty well acquainted with the capabilities of his little Acme, and has tried it out under some rather gruelling tests.

In the first place it is the only one-tonner equipped with solid tires all around that has been sold by the Brockton agents. In the second place it has on it a body that was taken off a two-ton truck of another make. The body is substantially built, even for a two-ton truck, and is heavily ironed, for it was designed to carry ice and it is in this work that Mr. Cushman has used it.

Finding that the truck would haul ice so handily over the road, Mr. Cushman conceived the idea that it ought to be equally as good for other things. The winters on the southeastern coast of Massachusetts are particularly uncertain and a man in the ice business has to do some hustling when it comes to getting his crop under cover. Generally we do not have any real cold weather until after Christmas, and then, if it is cold enough to make ice of marketable thickness the cold spell may suddenly disappear and the ice along with it.

This was the problem that Mr. Cushman was up against. He knew it of old and he made up his mind that he could depend upon his little Acme to square things for him this winter and, in a measure, perhaps to make up for losses in other years when he had depended upon horses. He began figuring the thing out early last fall, and at the time of the



Filling Ice House by Power Developed by Motor Truck.

Brockton fair unfolded his plans to the writer, who was politely enthusiastic and allowed that he guessed it could be done, further requesting Mr. Cushman to let him know if he ever put the plan into action.

Witnesses Summoned.

The writer gave no further thought to the matter till one day the latter part of January he received a telephone call from Kingston. Mr. Cushman was on the other end of the wire and announced that he had his Acme all rigged up for hauling ice from the pond into the ice house, and that operations would be started the following morning. "Would Mr. Sherman care to see it done?" Mr. Sherman certainly would and did. In spite of the poor roads, the cold weather and the 20-mile trip, he was on hand at the pond next day, aided and abetted by Photographer Leon W. Rand of Brockton. Mr. Rand, by the way, is the man behind the camera who has taken pictures of every Acme truck sold in Brockton territory as fast as said trucks could be captured for photographic purposes.

Meanwhile, Mr. Cushman, with a glowing and justifiable sense of pride, explained the mechanism of hauling ice into an ice house with an Acme truck. The principle is simplicity itself. The truck was run as close to the ice house as possible, right near the edge of the pond. The rear end was jacked up on the left hand side and the right hand wheel securely chocked against an adjacent tree. A small steel cable was attached to the brake drum on the left hand wheel. This ran through a series of pulleys to the hoist that pulls up the ice carrier. A wooden drum had been built on the outside of the hub and around this was coiled a stout rope which took the weight of the ice carrier on its downward trip. Running the motor slowly, in fact, almost idling, the load of ice (eight cakes, weighing 125 pounds apiece, each cake 22 inches square and eight inches thick) was hauled up in reverse. When the ice was at the top of the run and unloaded, the car was gently let down by running the motor in second speed.

Stores 250 Tons in Four Hours.

While the Brockton party was there 250 tons were put in that morning in four hours, a stunt that it would take horses a couple of days to do. The whole house, with its cargo of 1000 tons of frozen dollars, was filled in two days. With horses this would have taken a week or more, and in this particular instance would have been impossible, because the thermometer rose suddenly the night the job was finished and there was no weather cold enough later to make ice that could be cut.

Mr. Cushman's thousand tons of ice at average market prices would be worth at least \$12,000. Ice sells in Brockton for 70 cents per 100 pounds at retail. The wholesale price is from 40 to 50 cents. For the purpose of computing the value of Mr. Cushman's crop we have taken an average of 60 cents as its value.

It is hardly necessary to say that Mr. Cushman is more in love with his Acme now than ever.



Method of Taking Power from Motor Truck Rear Wheel to Pull Ice Cakes up the Run and Into Ice House.

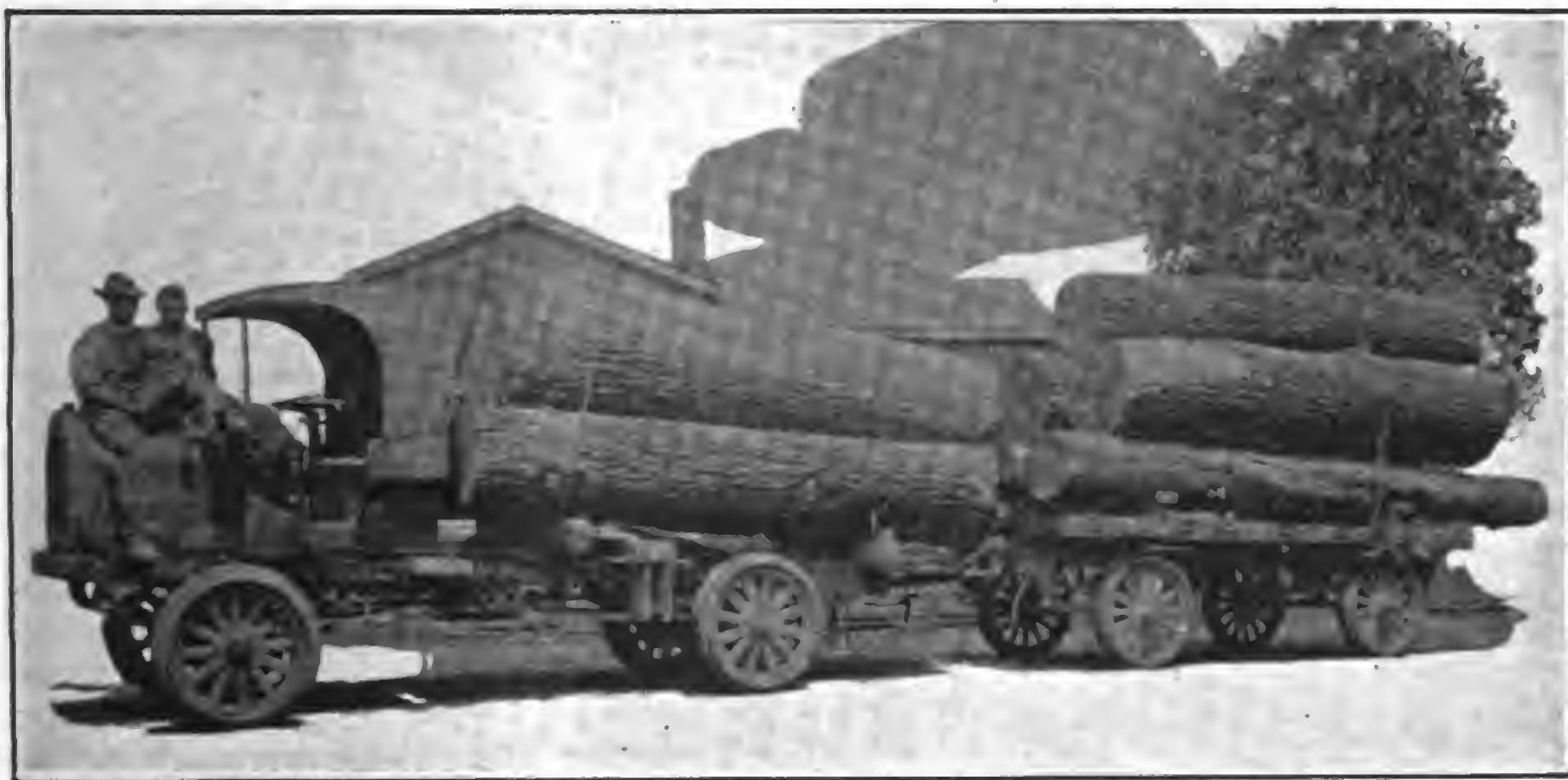
DUPLEX TRUCK REPLACES 10 MULES.

When J. W. Farley of Brentwood, N. J., was asked for some information about his Duplex Four-Wheel-Drive, he sprang a laconic "which one?" (Which is another way of saying that Mr. Farley owns a fleet of Duplex trucks.)

It really didn't matter, however, because, according to Mr. Farley, the story would have been about the same. The truck he picked out to describe had been in service 9½ months. During that time the Duplex averaged 45 miles per day, six days out of every week.

"About one-third of the total number of miles covered by this Duplex Four-Wheel Drive truck could not have been negotiated by a passenger car," says Mr. Farley. Much of the distance was through fields and wood lots. Part of the time the truck traveled 105 miles a day.

Logs and lumber were hauled, a six-room house was moved on rollers and skids across a cornfield and, when not otherwise engaged, the Duplex was used



Duplex Truck and Trailer Equipment Owned by J. W. Farley, Brentwood, N. J., Hauls Logs, Moves Buildings, Etc.

for general hauling.

Green oak, hickory, poplar and green maple logs were transported for distances of 35 and 40 miles. All loading was done by engine.

Mr. Farley insists that this particular Duplex truck has performed more work daily than had previously been possible with 10 mules.

During the 9½ months his only accident has been the breakage of one leaf in one of the rear springs.

HEAVY DUTY TRUCK MAKES RECORD TRIP OVER MOUNTAIN TRAIL.

California truck men have declared their interest in the installation of a through motor express service between San Francisco and Los Angeles, necessitating but one handling of freight, since one of the five-ton White trucks of Farnsworth & Ruggles, San Francisco draying firm, made its emergency trip from the northern city of Paris to the southern city of Los Angeles with \$40,000 worth of antiques, tapestries and furniture for the new Ambassador hotel.

Traveling down the valley via Bakers-



Fleet of Commerce Motor Busses Solves Problem of Conveying Help to and from the Mines.

field and over the famous Ridge route, the sturdy truck completed the first half of its journey in 31 hours, surmounting its greatest obstacle in crossing the Castiac mountains at a time when the roads were in a treacherous condition. The return trip was made in 30 hours running time.

"The outstanding feature of the trip from our viewpoint was the economy of

BUSSES HAUL MINERS.

More and more are manufacturing concerns using motor equipment to haul their employees. The Commerce Motor Car Co., Detroit, has been supplying a large amount of this equipment. The accompanying photograph shows a fleet of Commerce passenger busses in the service of the Sangamon County Mining Co., near Springfield, Ill., hauling employees to the mines. Rural schools are also big users of Commerce busses to bring children to and from the country schools.

NEW BOOKLET ISSUED BY WARNER GEAR CO.

The Warner Gear Co., Muncie, Ind., has just issued an attractive and interesting booklet entitled, "A Definite Object," for distribution to the automotive trade. While emphasizing the need for better gears, it outlines how this has been accomplished by the Warner Co. The care taken by this company for the welfare, health and ideal conditions under which its operatives work is described in detail and forms an object lesson to industrial concerns that are not so well equipped in this respect.

CALIFORNIA BUYING TRUCKS.

The registration of 747 new trucks in California during March shows that month to be a record period for truck sales. April promised to be an even better month than March.



Type of White Truck Used in San Francisco and Los Angeles Transportation Service.

The White Lines Operated in the San Joaquin Valley

"The White Lines" are engaged in the freight transportation business in the San Joaquin Valley, California, where the roads are well built and where there is sufficient volume of business to warrant operating trucks and trailers on a definite schedule which is steadfastly adhered to. The service which they render indicates clearly the relief which motor trucks will be able to provide for those having commodities to ship when the national system of hard surfaced highways, now planned, is completed.

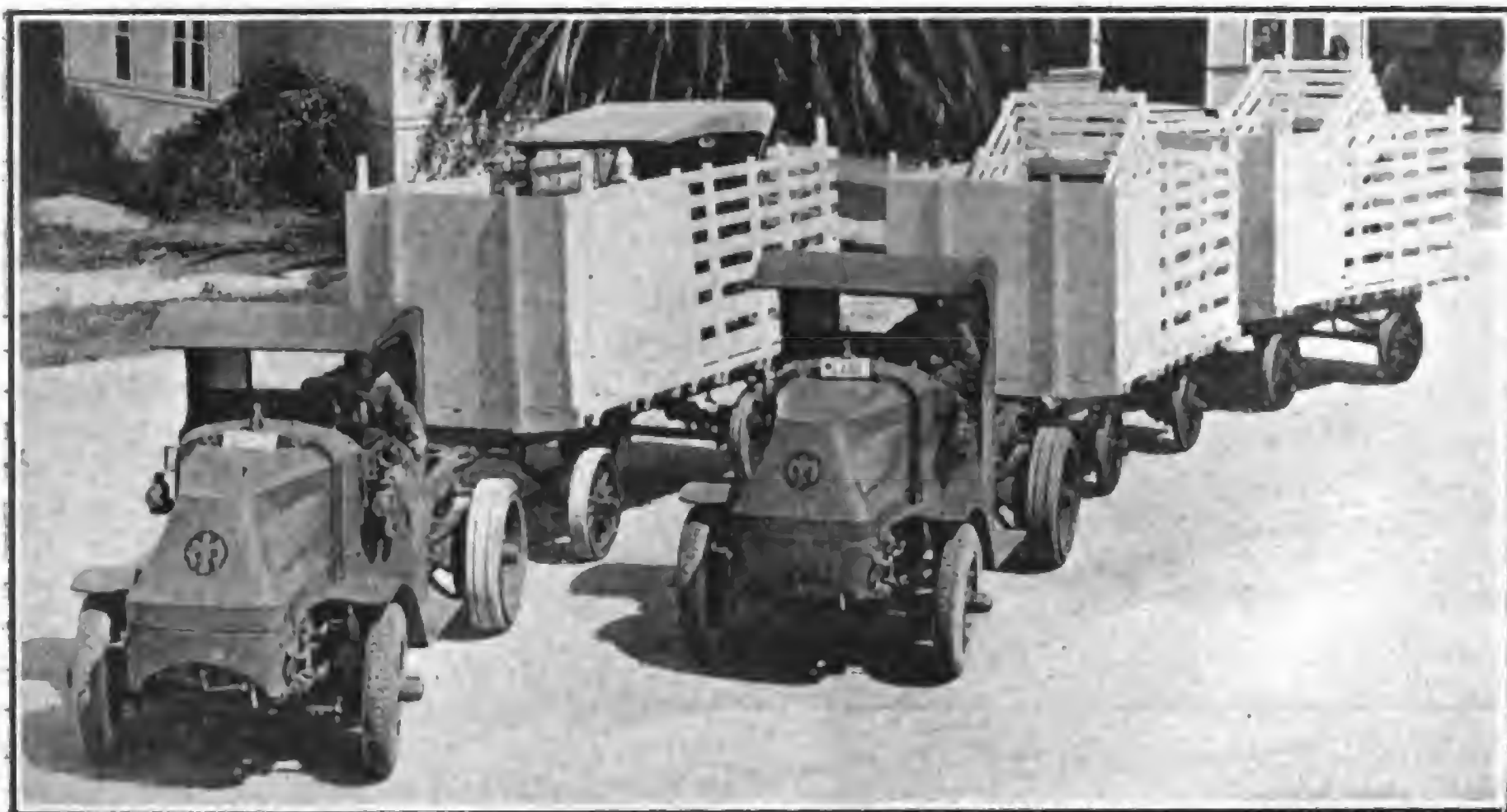
The territory served so effectively by "The White Lines" is one of the most productive agricultural regions in the far West. The general offices of the company are at Stockton, Cal., which is also the northern terminus of the route. Branches are maintained at Modesto, Turlock, Merced and Fresno, the last named being the southern terminal. In addition to these offices the company has representatives in all of the smaller

through quicker delivery, reliability and better condition of goods on arrival.

Time Tables and Rate Sheets.

Definite time tables and rate sheets are supplied to all shippers along the line and there has been a steady increase of business, month by month, since the company was organized. Before the trains are started from Fresno and Stockton, reports are received from all points along the way in regard to the space requirements of each station. The train is made up according to these reports. When a large quantity of freight is consigned to any one town it is placed on a trailer of suitable capacity and the trailer is left at that station and replaced by another. Great economies of time are effected in this way.

"The White Lines" maintain their own garages and mechanics. All trucks are inspected and greased daily. This plan has been found very satisfactory in keeping the trucks in good condition.



Mack Trucks and Trailers in General Haulage Transportation in San Joaquin Valley, Cal.

towns along the way. These resident agents bring in freight from their territory in small feeder trucks to the local shipping platform, where it is loaded to the through trains with very little delay.

All of the company's long distance hauling is carried on by five Macks used in conjunction with 16 trailers, which vary from 2½ to 10 tons capacity. Nine other small trucks are used for feeder service along the line. These Macks showed themselves to be capable of handling the work, and are now making daily trips with average loads of from 20 to 30 tons. One train is started from Fresno and one from Stockton at 5 a. m. The distance one way between these two points is 125 miles. Actual running time for this distance is nine hours, but the trip takes 12 hours on account of stops made to pick up and discharge freight. The trips are made six days a week, and at present 1000 tons of freight a month is being hauled. The cost of this transportation is slightly higher than the railroad freight rates, but considerably lower than express service. Patronage is secured

The trains operated by this company transport a maximum of freight with the least possible amount of road wear. The use of trailers distributes the weight of the load so that no portion of the road is subjected to any more pressure than would be the case if smaller trucks were run over it. Furthermore, the use of trailers reduces unsprung weight to a minimum, as there is no weight below the springs except that of the wheels and a light axle. The importance of this can be readily recognized when it is remembered that government tests, conducted by the United States Bureau of Public Roads at Washington, have shown that weight carried below the springs is the controlling factor in road wear.

To be sure, the cost of motor transportation decreases as the unit load capacity increases, but perhaps of even greater importance than this has been the carefully worked out system employed by "The White Lines" and their rigid adherence to time schedules. Their ability to perform satisfactorily the service which they have undertaken has been

the vital factor in gaining for them the good will of shippers in California. As "The White Lines" are now planning to extend their route another 125 miles, making a total round trip of 500 miles, it is quite obvious that the service is appreciated. They operate under the jurisdiction of the California State Railroad commission and reports are filed regularly.

ROAD BUILDING PROGRAMME TO PUT 1,000,000 MEN AT WORK.

The second annual convention of the Asphalt association, held at the association headquarters in New York, April 13, marked important general advances in the road building and street paving field. President Draney predicted that unless reactionary pessimism grips the nation, 700,000 men will be needed in the building of the 35,000 miles of new highways contemplated this year under the billion dollar road programme outlined by the Federal government and the states and counties. Three hundred thousand more men, he said, will be needed in the quarries, gravel pits, cement, brick and asphalt plants and factories devoted to the manufacture of road machinery. Stimulation in the production of trucks, machinery and raw materials and in engineering and the employment of labor can positively be accomplished with an untrammelled road building programme.

The association adopted resolutions:

Urging Congress to pass the Federal aid appropriation of \$100,000,000, thus assuring a continuance of road building under the supervision of skilled state and Federal engineers.

Urging that highway management be divorced from politics and all materials and methods entering into highway construction be placed in open competition.

Declaring that every highway be required to show traffic justification for its construction, thus guarding against waste and extravagance.

EARL HEADS BRISCOE.

The Briscoe Motors Corporation, Jackson, Mich., has elected Clarence A. Earl president and general manager. He was formerly vice president of the Willys-Overland Co. H. F. Wardwell, the retiring president, will continue as a vice president and director of the company. K. R. Jacoby, another former Willys-Overland vice president, has also joined Briscoe.

GARVEY REPRESENTING SELDEN.

T. E. Garvey will represent the Selden Truck Corporation, Rochester, N. Y., in the territory including Kansas City, St. Louis and Des Moines and thereabouts. His headquarters will be at Kansas City, where he recently placed the Selden agency with the Peiser Selden Sales Co.

The Springfield Commercial Body Works, Springfield, Mass., has appointed J. A. Priest manager. He was formerly with the J. H. Bordeaux Co. and the Hendee Manufacturing Co.

SEWELL CUSHION WHEEL CROSS CHAINS.

The Rowe Calk and Chain Co., Plantsville, Conn., shows a special type of cross chain for use with Sewell Cushion wheels for motor trucks.

Sewell wheels are now made with either six or eight 1/2-inch holes drilled through the felloe, according to the size of the wheel. With the cross chain equipment for this type of wheel is included a sufficient number of 1/2-inch bolts, which are 3/4 of an inch longer than the width of the felloe. The bolt is threaded 3/4 inch on each end to receive drop forged loop eyes, one with a flat bottom for the inside of the wheel and one with tapered bottom, as the outside of the hole is countersunk. The cross chain is attached to the eye loops with either chain lock hooks or lock links, both of which are drop forged and heat treated. The lock links are standard equipment and the lock hooks may be substituted on request.

Four-inch single tires take four-inch bolt, five-inch takes five-inch bolt, etc. Four-inch dual tires take nine-inch bolt, five-inch dual tire 11-inch bolt, six-inch dual tire takes 13-inch bolt and seven-inch dual tires takes 15-inch bolt.

MEXICO BUYING TRUCKS.

Business is good in Mexico, as indicated in the report of February exports. In that month 209 American trucks were sent to Mexico, 68 to Canada, 62 to the Dutch East Indies, 57 to New Zealand, 41 to Cuba, 31 to Japan, 24 to Sweden and 20 to the Straits Settlements.

In 66 large cities there were 3808 deaths from motor car accidents in 1919.

Comparison of Long and Short Haul Shown by Rochester Co.

(By B. J. HENNER, President B. J. Hen ner Co., Rochester, N. Y.)

"Long hauls are a regular thing with us and you're likely to see our Atterbury motor trucks on the road anywhere within 500 miles of Rochester. Frequently they go even farther, and we never worry about them making the trip.

Truck	Miles Run	Miles per Day
No. 6.....	7932	53.23
No. 3.....	3834	25.7

"This company is engaged in trucking of all kinds. We began using Atterburys five years ago and now have eight of them. Three of the five-year-olds are still in service and working every day, being used on shorter runs about the city. The newer ones make the long hauls. The Atterburys are working alongside of other trucks of the same tonnage and have proved themselves strongly built, good pullers and generally satisfactory.

"Recently we moved a clothing manufacturing concern from New York to Rochester, a distance of 381 miles, by truck. Moving this way the factory was able to close down certain machinery when the truck arrived, load it on the truck and send it on to Rochester, where two days later it was running again full capacity.

Two Days Vs. Two Weeks.

"The cost to move this firm was higher by truck than by freight, but it was worth the difference because of the time saved. Shipping by freight would have

meant shutting down the whole factory for at least two weeks. The firm would not only have lost two weeks' production, but also two weeks of rent, salaries, overhead, etc., that must be paid whether the factory was operating or not. Ship-

Miles per Gal. Gas	Miles per Gal. Oil	Cost per Day	Cost per Mile
6.25	201	19.42	\$.3647
3.96	206	14.16	\$.5504

ping by truck reduced this lost time to almost nothing.

"In another case we moved a mercantile agency from New York to Rochester. Part of the equipment moved was a printing press and considerable type matter in forms. It was very important that none of this stuff should be lost or held up by freight. The set type would have been very hard to ship by freight without a good deal of crating and careful packing.

"A large part of our business consists in moving household goods, both in the city and nearby points. We make several trips a week to Buffalo, and have gone to Philadelphia, Boston and other points in New York and New England. We can haul furniture at less than it would cost by freight, because shipping by truck requires no packing, no hauling to and from freight depots, and no large delays while waiting for freight cars.

Operation Methods Affect Costs.

"As examples of what our Atterburys are doing, take two two-ton trucks, one three years old last February, the other two years, and study their records for the six months ending Aug. 1, 1920. The three-year-old has cushion wheels, the other is running on pneumatics. Both worked 149 days. Truck No. 6 gets higher mileage and higher cost per day, with lower cost per mile, because it is used on the long distance runs. Truck No. 3 is used for city hauling and loses time and lets its engine idle waiting at freight depots and delivery points. Both trucks are doing efficiently the work given them."

DENBY ORGANIZATION ADDITION.

The Denby Motor Truck Co., Detroit, Mich., announces the following addition to its organization:

Charles E. Davy, former sales manager of the Universal Products Co., Detroit, becomes district manager with headquarters at Detroit.

L. G. MELDRAM IS NOW TRAILER ASSOCIATION MANAGER.

L. G. Meldram, who has had wide experience in the motor truck, passenger car and export fields, has been appointed general manager of the Trailer Manufacturers' association, to succeed H. W. Perry, who resigned.



Method of Fastening Steel Cross Chains to Sewell Cushion Truck Wheel.

ECONOMY BY USE OF PNEUMATIC TIRES

(By F. J. SWEENEY, Sweeney Bros., Inc., New York City.)



Ward LaFrance 2½-Ton Truck Equipped with Pneumatic Cord Tires Negotiates Roads Impassable to Solid Tire Equipped Trucks.

"Up until 10 months ago we used solid tire trucks on our long distance hauls and made fairly good records for this type of truck. At that time we put on a Ward LaFrance 2½-ton high speed pneumatic tired truck and have been delivering merchandise within a radius of 800 miles. We find it to be the only logical equipment for our business, as it upholds

our own original policies and gives maximum service to our customers.

"Although we have records for very fast time between New York, Philadelphia, Atlantic City, Buffalo, Richmond, Boston, Concord and Cape Cod—I think that our recent trip to Boston establishes a most unusual record. Leaving New York city with load at 12:30 a. m., we

arrived in Boston at 11:30 a. m. unloaded and spent the afternoon and evening there. We left Boston at 6 a. m. the following day. The actual running time of this round trip, including one hour each way for lunch and refilling of gas tank, was 21½ hours. The distance travelled was 490 miles at an average speed of 25.13 miles per hour.

"Our cost records show that the average gas consumption is eight miles to the gallon, oil consumption 500 miles to the gallon.

"The truck has traveled 15,000 miles to date on the original pneumatic tires, which are 36x6 and 42x9. Our only repair expense has been that incurred in relining the clutch and brake. We have constantly observed the performance and mechanical condition of this truck and feel assured that the pneumatic tires will save us expense in overhauling.

"This truck has been through villages in the Alleghany mountains where solid tired trucks have never been known to go. We have negotiated the hilliest country, muddiest and roughest roads and plowed through the deepest snow storms successfully."

AGREEMENT REACHED BY TECHNICAL COMMITTEE ON IDEAL HIGHWAY

The technical committee or board of highway experts, appointed by the Lincoln Highway association, to determine the general specifications for an "Ideal Section" of the Lincoln Highway, has reached an agreement on all points and the final plans are now being prepared. The ideal section is to be a relatively short stretch of highway, so located as to be easy of access from all parts of the country for the purpose of inspection, and placed also where it will carry a most representative and diversified traffic in the course of the coming years.

After long deliberation and much discussion the committee unanimously voted to predicate the specifications for the ideal section upon an average traffic of 15,000 passenger cars, traveling at 35 miles per hour, and 5000 motor trucks, traveling at 10 miles per hour, per 24-hour day. These arbitrary figures indicate that the technical committee believes that 20,000 mixed vehicles per 24-hour day represents the practical limits of traffic on one road.

The committee quickly agreed upon a minimum right-of-way of 100 feet. The majority of American roads have a 60-foot right-of-way—far too narrow, according to the minimum standard set by these practical men. One hundred and ten, or 112, or even 125 feet of right-of-way may ultimately be determined upon as necessary, but 100 feet is the minimum.

After long discussion the committee finally agreed on 40 feet of concrete paving, with reinforcing steel embedded, 10 inches thick and laid in one continuous

slab without central subdivision. Forty feet of paving width permits four lanes of travel, a lane for slow moving trucks and a lane for rapidly moving passenger vehicles, in each direction.

In determining upon the kind and thickness of the paving and the use of reinforcing steel, the committee was providing for permanency and endeavoring, insofar as possible, to cut down annual maintenance charges. In planning this thickness and design the committee did not assume much greater weight on four wheels than is allowed by the several states at the present time. Twenty-eight thousand pounds on four wheels was considered the practical road limit.

The ideal section will be drained by catch basins and submerged tile under the earth shoulders. No danger of being crowded into a ditch. There will be none there.

Public Safety Considered.

The committee provided that the ideal road should have no curves of a radius of less than 1000 feet and that such curves as were necessary should be "super elevated," which means tipped up at the outer edge, to allow for a speed of 35 miles per hour. It provided for the lighting of the route, which would permit of the use of dimmers in the open country, and it added a foot path for pedestrians. The committee allowed 25 feet of right-of-way at the outer edge for development by a landscape architect, provided also in its recommendations for frequent park and camp sites, comfort stations and other facilities for the comfort and enjoyment of the traveler.

The safety and convenience of the traveling public was further considered in the provision for protection of all embankments with guard rails and warning signs and the elimination of all railroad

crossings at grade, and the removal of all obstructions insofar as possible, for 500 feet each way from intersections, thus providing a clear view of the coming travel on cross roads.

The committee emphatically pronounced against advertising signs along highways and recommended that ultimately all distance markers and such other signs as might be necessary for the information and guidance of tourists be placed or authorized only by proper state and federal authorities and that distance markers be standardized in character and distance between points uniformly figured from municipal headquarters.

Along the ideal section there will be no unsightly wires, as these will run underground in conduits.

By 1922, at the latest, the thousands who yearly drive the Lincoln Highway, and other thousands drawn from every section of the Union, will be enabled, for a short stretch—a mile, or perhaps two miles—to drive along a tangible exemplification of the perfect modern highway, the purpose of which will be primarily educational.

The ideal section will serve the purpose the Lincoln Highway conceived for it and the purpose the United States Rubber Co. had in mind in appropriating the funds necessary to construct it, if the American public will be enabled to gain from it a more adequate conception of the demands of modern traffic in the way of highway improvement and if highway builders having in their charge millions of dollars of public funds, can, through the inspiration of its example and an enlightened public sentiment, increase the adequacy of their specifications and provide more nearly what the future will demand.

Operating Principle of the Four-Stroke Cycle Automotive Engine

HISTORY tells that four-stroke cycle principle, adapted to automotive engine, was first patented by Nicolaus August Otto of Dautz, Germany, on Aug. 14, 1877. This idea is still embodied in automobile, truck and tractor engines. The conception of compression and four cycles of operation was not, however, original with Otto. He combined these ideas into a practical engine. Twelve years were taken in their creation and three other countries participated in their evolution. The inception of the idea was in 1862, when a Frenchman, Alphonse Beau de Rochas, obtained a patent and wrote a pamphlet on the four-stroke cycle engine. Six years later Boulton, an Englishman, secured a patent covering the use of compression in an engine. However, Boulton failed to work out the necessary means for compression in a practical way.

The Automotive Engine.

Practically all automotive engines using gasoline or kerosene for fuel, are driven by explosions, which take place within the combustion chambers of the cylinders of the engine, and drive the pistons thus supplying motive power to the engine. These explosions are in a manner similar to the explosions of gunpowder or dynamite. When a charge of gunpowder is fired in a cannon or gun, the gunpowder burns and produces gases which expand and exert a tremendous pressure on the projectile forcing it from the muzzle of the gun with great velocity.

Practically any substance that will burn can be exploded under the proper conditions. An explosion is merely the burning of some material almost instantaneously resulting in a great amount of heat being generated simultaneously. When any substance burns, it unites rapidly with oxygen from the air. In order to have an explosion, it is necessary to have the fuel finely divided and carefully mixed with air, so that the burning can be very rapid. Then, if the fuel is ignited by an electric spark or other means, the flame instantly spreads throughout the mixture and an explosion occurs.

In a gasoline engine, gasoline vapor mixed carefully with air is taken in. This mixture is then exploded inside the combustion chamber at the top or rear of the engine cylinder. The force of this explosion drives the piston and the motion is transmitted through the connecting rod to the crankshaft. To make the process continuous and keep the engine turning, it is necessary to automatically rid the cylinder of the burned gases from the previous explosion and to allow a fresh charge to get into the combustion chamber ready for the following explosion. This process must be carried out regularly by the engine, in order to keep it running steadily.

It must be remembered that a cycle refers to the series of operations the engine goes through. In the four-stroke

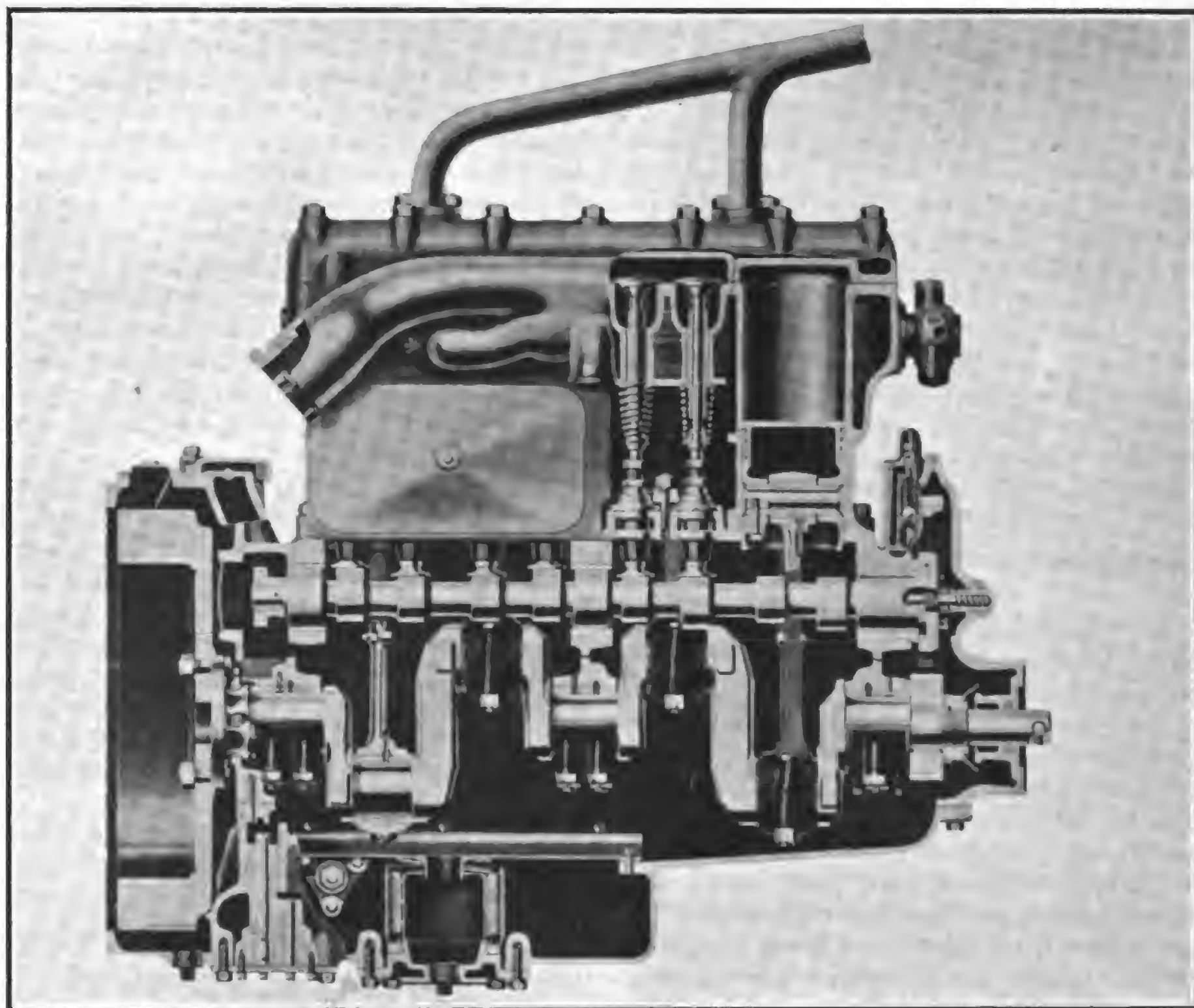
cycle four strokes or two revolutions are required to complete the cycle.

The Four-Stroke Cycle Engine.

Often the word "stroke" is left out and the engine is called "four-cycle". This might cause a misunderstanding as to just what a cycle really is. The better nomenclature is "four-stroke" engines and confusion will be avoided.

The illustrations, A, B, C and D, show an engine which operates according to the four-stroke cycle. This is a vertical I-head engine; that is, the cylinders are placed above the crankshaft (instead of at one side) and the piston moves up and down in the cylinders. This is the more

cylinder and receives the force of the explosion; the connecting rod, which transmits the force from the piston to the crankpin on the crankshaft; and the crankshaft, which is turned by the downward movement of the piston and by its momentum brings the piston back to its starting point. When the piston is at the top of its stroke, and the engine crank pin is also in its extreme upper position, the engine is said to be on its upper dead center. When the piston and crank pin are in the extreme lower position, the engine is on lower dead center. A four-stroke engine has a number of other minor parts, the function of which will be brought out later.



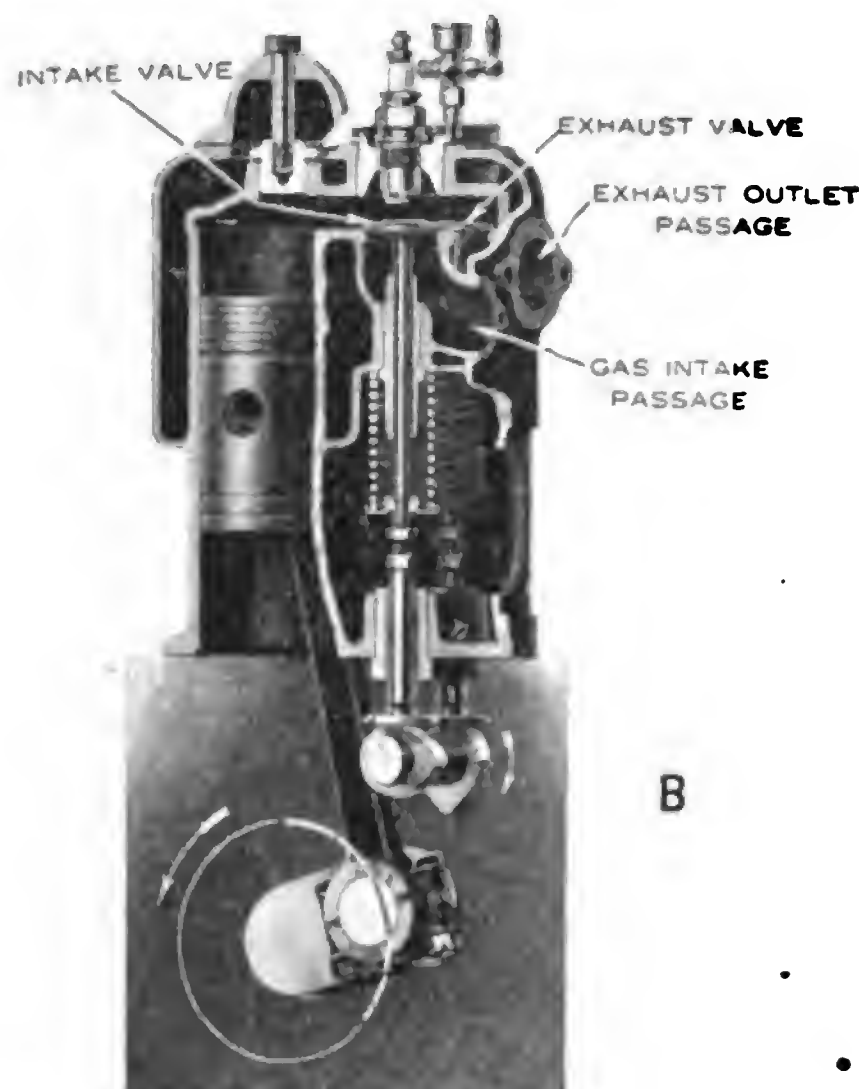
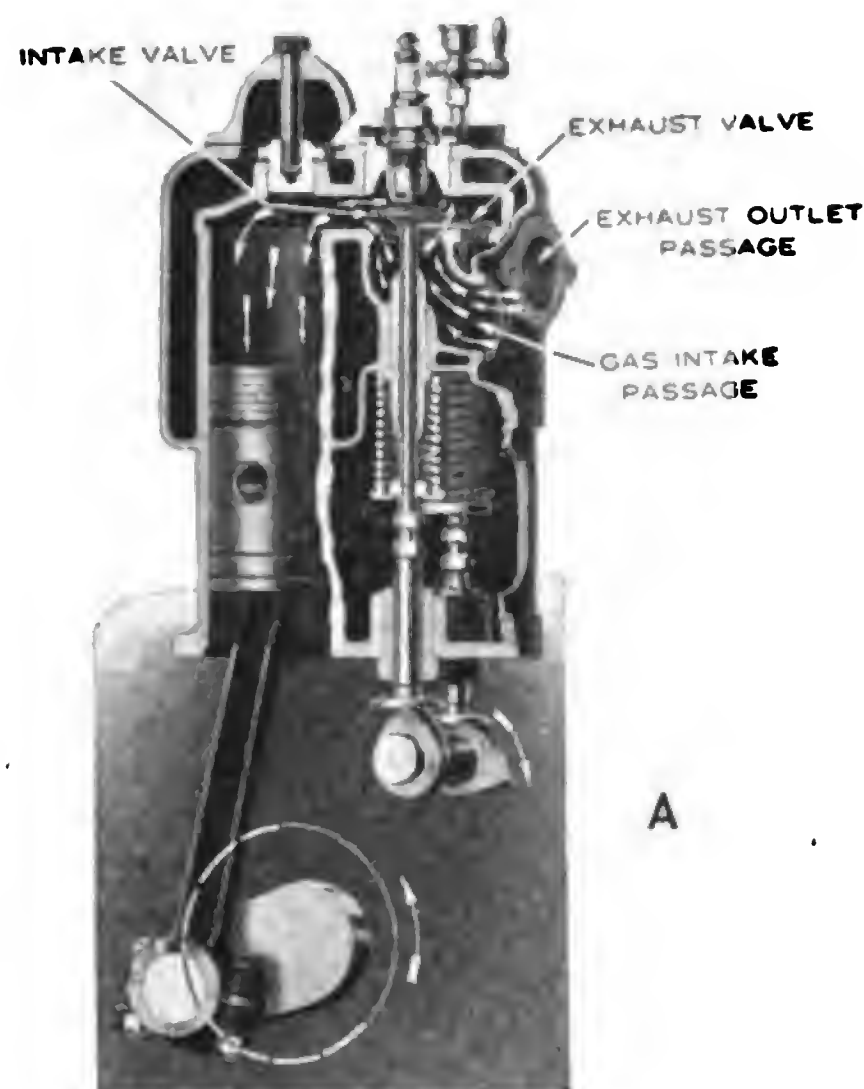
Continental Red Seal Engine Model J-4, 3 1/4 -Inch Bore, Five-Inch Stroke.

usual form of automotive engines in trucks and tractors although in many another type is used having the same four-stroke cycle but with valves located in the head instead of in the pockets at the side as in the L-head engine. This is known as the vertical I-head type.

In many of the older engines the valves were located in pockets on both sides of the engine, exhaust valves being placed on one side and inlet valves in the opposite pockets. This form is known as the T-head type, the valves being operated by two camshafts while in the L-head and I-head engines the valves are operated by a single camshaft.

An engine consists of four principal parts: The cylinder, which is stationary and in the top in which the explosion occurs; the piston, which moves within the

The engine shown in the illustrations, A, B, C and D, uses four strokes of the piston to complete the series of operations from one explosion to the next, and may be said therefore, to be typical of all four stroke engines. "A" shows the engine just beginning to draw in a mixture of gasoline and air through the intake or inlet valve. This is continued until the piston reaches the bottom of the stroke and the cylinder is full of explosive mixture. This operation is called the suction stroke. Then the valves are closed, as in "B", and the piston is forced back to its top position. This squeezes or compresses the gas into the space left in the top of the cylinder, called the combustion space. This process of compressing the gas is called the compression stroke. After the piston reaches



A—Suction Stroke, Inlet Valve Open Taking in Gas Mixture; B—Compression Stroke, Inlet and Exhaust Valves Closed, Piston Compressing Charge.

the top, the gases are ignited and burn so quickly that an explosion results and the piston is driven down again, as in "C". This is called the expansion or power stroke. When the piston reaches the bottom of the stroke, the exhaust valve is opened and, while the piston is returning to the top position, it forces out through this valve the burned gases which occupy the cylinder space. This is the exhaust stroke. The engine now continues to operate, repeating the same series of operations. A stroke means the movement of the piston from one end of the cylinder to the other; consequently, there are four strokes in the cycle of operations of this engine.

Advantages of the Four-Stroke Cycle Engine.

As compared with the two-stroke cycle type of engines, a fairly heavy charge of gas enters the cylinders due to the comparatively long period of the opening of the inlet valves. This is of great importance in high-speed engines, such as are used in truck and tractor operation as, even with the long periods, the intake becomes very short when the higher speeds are reached and much less gas enters the cylinders. Even in lower engine speeds it presents advantages. The cylinder retains its full volume of gas until after combustion occurs and the exhaust gases are forced out of the cylinders by the return stroke of the piston, during which time the intake valve remains closed and no dilution of gases occurs. Although some of the spent gases remain in the cylinders of a four-stroke cycle engine, the quantity is much less than in the two-stroke type and does not have much effect on the next fresh charge.

Multi-Cylinder Engines.

For small, moderate powers a single-cylinder engine possesses the advantage that it is of the simplest possible construction, is inexpensive to manufacture and maintain, and more economical in the use of fuel. Along with its advantages, however, it has two inherent defects, especially from the standpoint of its use in commercial vehicles, for which reason

it is seldom employed. In discussing the cycle of operations it was stated that the power impulses were irregular, due to the fact that the power stroke occurs every other stroke, or every fourth stroke and that the gases which are compressed in the cylinders require a certain portion of power to overcome them.

Therefore to keep the engine running at a fairly uniform speed against a nearly constant resistance it is necessary to employ a heavy flywheel in which some of the energy liberated on the power stroke can be stored, to be given out again during the idle strokes.

In a single-cylinder engine the entire reciprocating mass (that is, the piston with its parts, the connecting rod, bearing and crankpin), is in a single unit and the reaction of the inertia force of the parts produces a strong vibrating effect, while in multi-cylinder engines the reciprocating masses can be divided into several units and so arranged as to move in opposite directions, thereby neutralizing the effects of inertia.

The two-cylinder engine presents some advantages over the single-cylinder type.

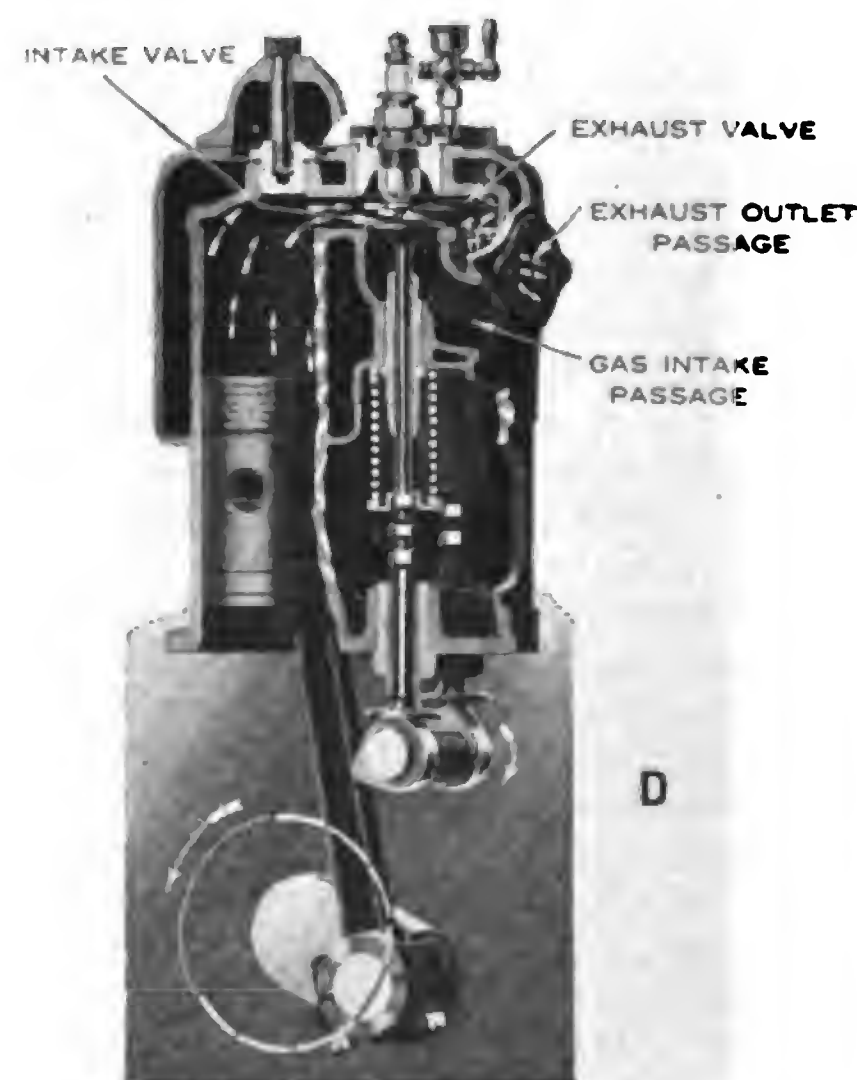
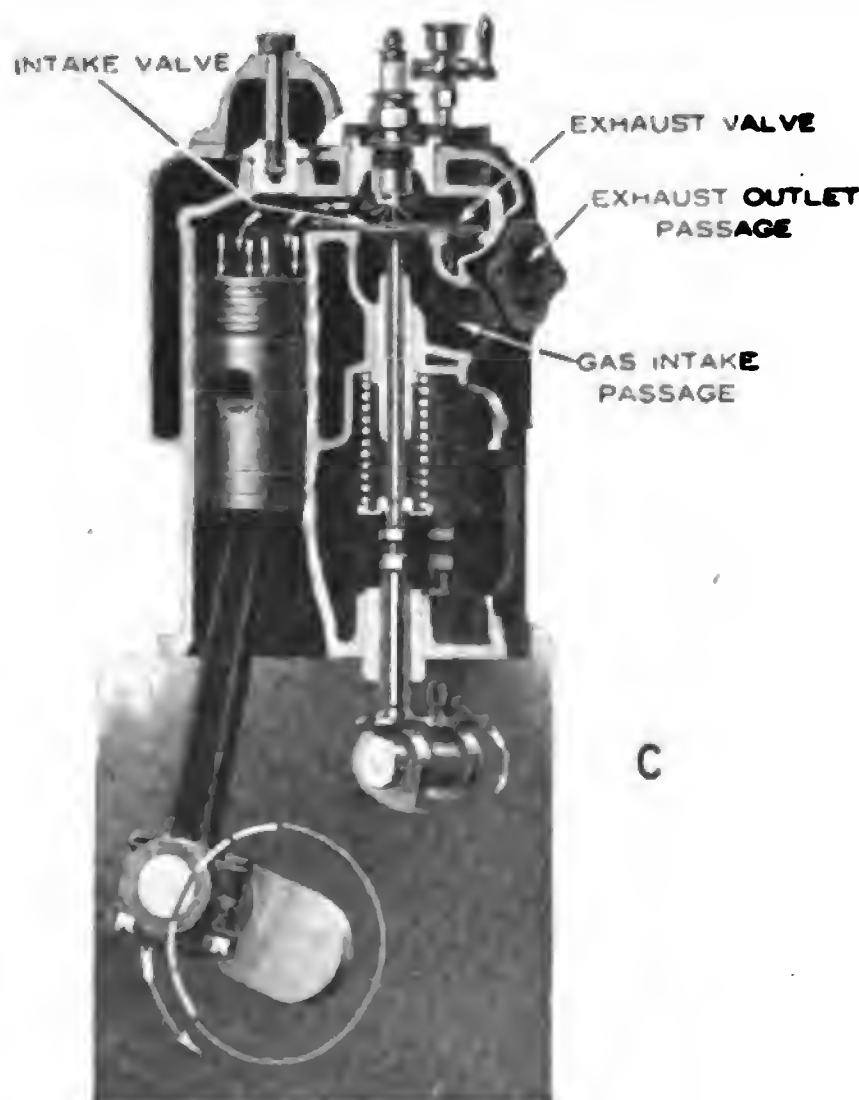
However, their use is also somewhat limited, and it is only a question of time until all commercial vehicles will be equipped with four-cylinder engines. The two-cylinder type presents an advantage over the single-cylinder in that there are two reciprocating masses, so arranged that the two inner work against the two outer masses. Although they are equal in weight, they operate in opposite directions.

The turning movement of a four cylinder engine is all so much more uniform than that of the two-cylinder engine, hence the torque reaction and vibration are much smaller. This four-cylinder type, when properly constructed, meets the requirements of vibrationless running quite satisfactorily.

Order of Events in Four-Stroke Engine.

The periods in the four-stroke cycle are seen in the illustration. This shows the two revolutions of a four stroke cycle so as to denote the crank positions when the different events occur. The diagram is drawn for a vertical engine with the crankshaft revolving to the right. This is the direction of rotation of an automobile engine to a person standing in front of the car looking toward the engine.

Assuming that the engine piston has reached the top of its stroke and has started back on its return stroke, the crank of the engine will also be moving down until at point A when the crank angle will be around 10 degrees, and the inlet opens. From A to B the suction stroke of the piston takes place, the inlet valve closing about 20 to 30 degrees past the lower dead center. The inlet valve has thus been open 180 to 200 degrees. From crank position B to crank position C, the gas is compressed, both valves being closed. From five to 10 degrees before the upper dead center is reached, the gas is ignited and the burning or combustion occurs from the crank position C to the crank position D, or during a period of from five to 10 degrees. The full force of the explosion is exerted just as the crank passes the upper dead center and the piston begins to descend.



C—Igniting Charge and Power Stroke, Inlet and Exhaust Valves Closed. D—Exhaust Stroke, Piston Forcing Burned Gas from Combustion Chamber.

From crank position D to that at E, the expansion of the gases takes place. At E, which is from 30 to 45 degrees before lower dead center, the exhaust valve opens permitting the gases to be exhausted while the crank is moving from E around to F where the exhaust valve closes a few degrees past the upper dead center, thus completing one cycle.

This description well illustrates the four-stroke cycle of a single cylinder engine, while for two, four, six, eight or twelve cylinder engines, the four-stroke cycle is the same and each cylinder of the engine is fired on this principle according to the number of the cylinders and their firing order.

Mechanism of Four-Stroke Engines.

The details and the mechanism of a four-stroke engine having four cylinders are shown in the illustrations. The cylinders are cast in one piece from gray iron, which is the usual material for cylinders. The gray iron flows freely when being cast, is easy to machine, and presents a good wearing surface to the piston. The water jacket around the cylinders is generally made a part of the cylinder casting, although some jackets are of copper and enclose the cylinder casting. The design of the water jacket is very important, especially in heavy-duty work, as sufficient cooling surface must be provided and all pockets where steam might collect must be avoided.

The cylinder head can either be cast solid with the cylinder or singly and made removable, being fitted to the cylinders by means of a copper asbestos gasket or ground joint and fastened by a number of steel studs. The removable head provides easy access to the cylinders for working purposes. The cylinder is made smooth inside by being bored out and is usually ground to size with a grinding wheel. The inside diameter of the cylinder is usually spoken of as the bore of the engine.

Pistons and Piston Rings.

The pistons which receive the force of the explosions and the resulting expansion of the exploded gases and transmits the motion to the connecting rod and

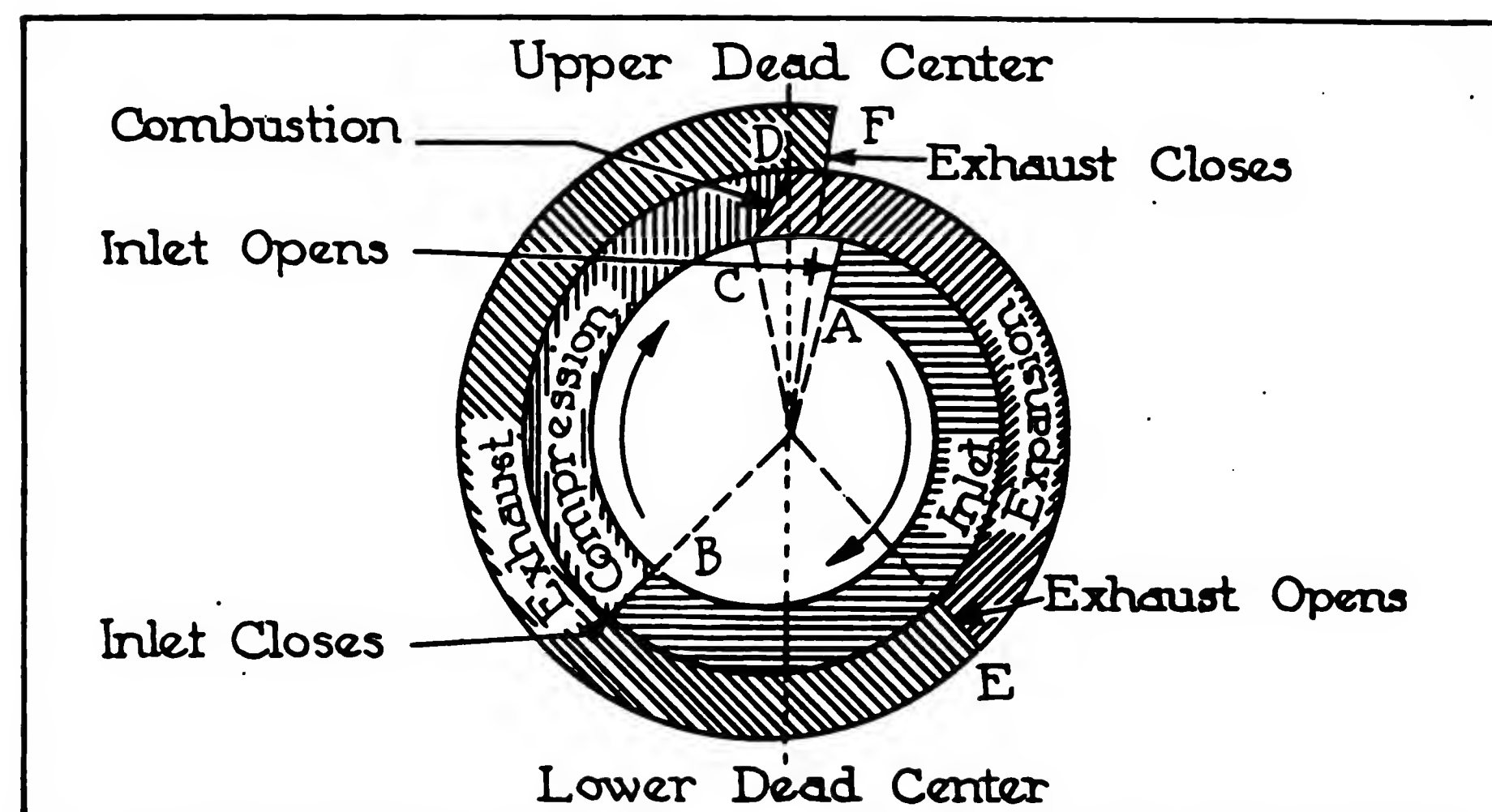


Diagram Showing Order of Events in Four-Stroke Cycle Automotive Engine.

crank are commonly made of soft gray iron, although some pistons are of aluminum and also aluminum alloy called lynite. The aluminum and alloy pistons have the advantage of being light, and it is also claimed that they radiate heat much faster than cast iron. Being lighter than cast iron, the aluminum or alloy piston is easier to move up and down in the cylinder. The expansion of these pistons is more than for cast iron and, consequently, a greater clearance must be provided when fitting them to the cylinders.

The pistons are turned and ground so that they will be a few thousandths of an inch smaller in diameter than the cylinder in order that there will be a good sliding fit without undue friction. The pistons are made gas tight by means of cast iron piston rings placed in grooves around the body of the piston. Ordinarily three rings, placed in the piston above the wrist pin, are used. In some cases an oil groove is also cut in the piston below the rings to improve the lubrication between the piston and cylinder walls. In still other engines pistons are fitted with a fourth piston ring below the wrist pin which acts as a scraper ring, preventing too great an amount of oil from the cylinder walls passing by the

pistons and fouling the combustion chamber and the top of piston. To still further obviate this, the lower edge of this ring groove is bevelled at the edge, $\frac{1}{8}$ -inch holes being drilled at an angle to allow excess oil to drain through the skirt of the piston and return to the engine base by gravity.

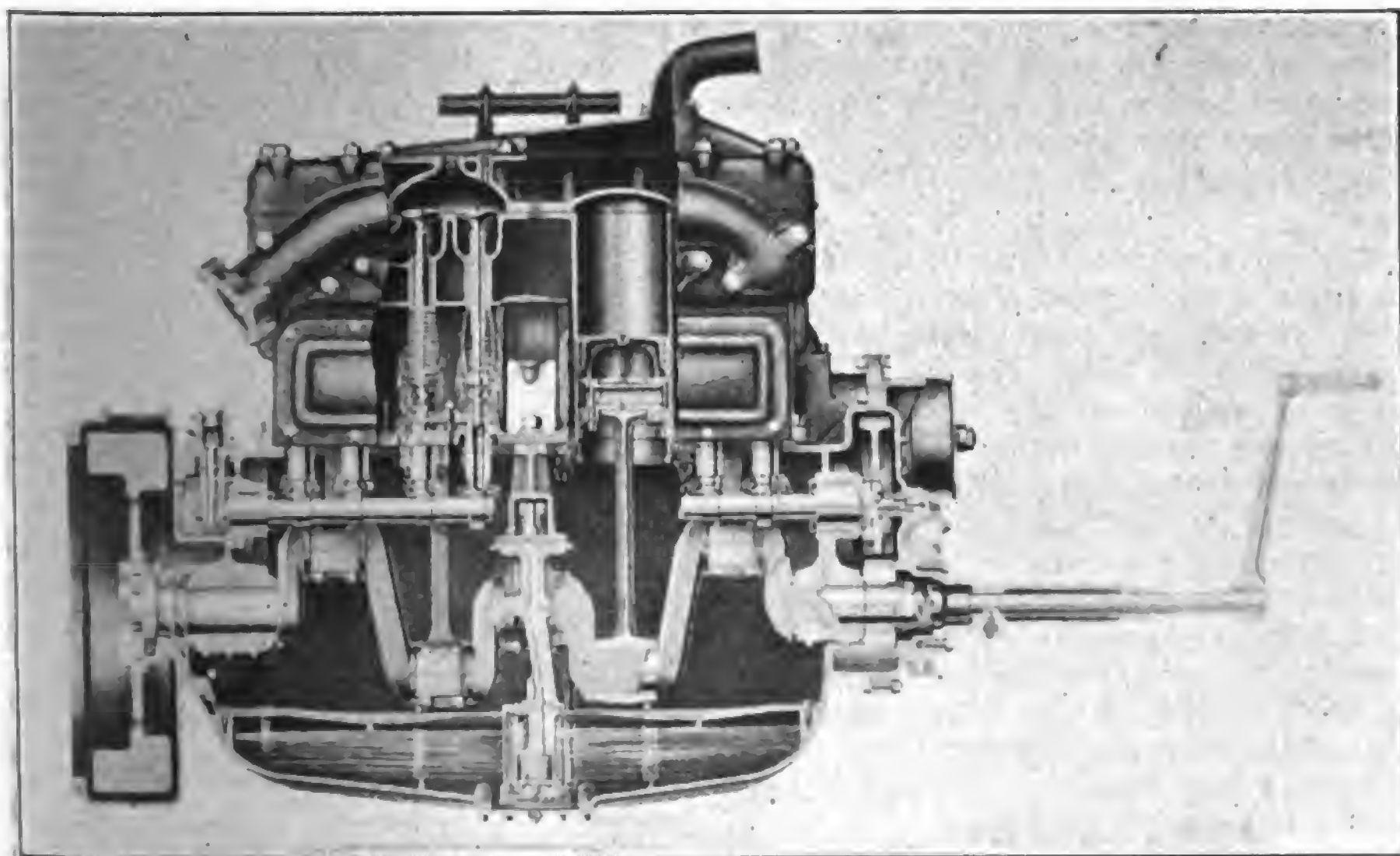
Piston rings are of two general types, the concentric and eccentric, the difference being that concentric rings are of uniform thickness, while the eccentric rings are considerably thicker on the opposite side of the opening. In addition to these types of one-piece rings, numerous patented and two-piece rings have been devised so as to combine the advantages of both the concentric and eccentric types.

The pistons used in truck and tractor engines are mainly of the trunk type, explosions taking place on one end only. The other end is open and allows free movement of the connecting rod. The length of the piston is usually $1\frac{1}{4}$ times the diameter. The head of the piston is commonly made flat, although occasionally pistons with slightly concave or convex heads are seen.

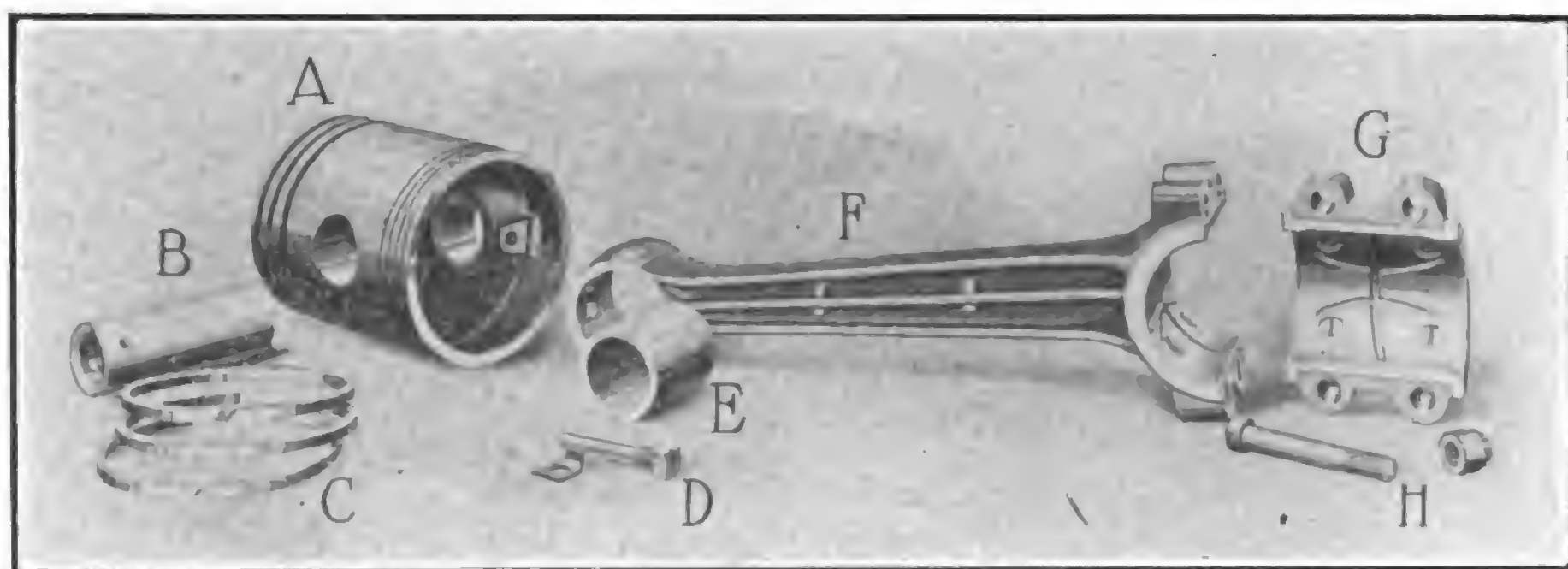
Connecting Rods.

The connecting rod may be either a forging or a steel casting and either solid or of I-beam section. The connecting rod is under compression at all times and the I-beam section is considered the best for withstanding the tendency of the rod to bend. The connecting rod is attached to the piston by means of a steel wrist pin. This pin may be clamped either to the connecting rod end and turned on a bearing in the piston or it may be clamped to the piston bosses and the connecting rod turn on the fixed pin. The bearing in the small end of the connecting rod is usually a bronze bushing forced on to the rod and then bored or reamed to size. The wrist pin is usually made hollow in order to reduce weight and to increase the outside bearing surface.

The lower end of the connecting rod turns on the crankshaft. One-half of the bearing is generally found in the rod itself, the other half being supported by the cap which is bolted to the rod. By adjusting these bolts, the wear on the bearing can be taken up from time to



Sectional View Buda Four-Cylinder, Four-Cycle, L-Head Engine.



Disassembled Connecting Rod and Piston: A, Piston; B, Piston Pin; C, Piston Rings; D, Piston Pin Locking Screw and Retainer; E, Connecting Rod Bushing; F, Connecting Rod; G, Connecting Rod Split Bearing; H, Connecting Rod Split Bearing Bolt and Nut.

time. The shims are very thin pieces which are placed between the halves of the connecting rod bearing when the halves are tightened together by the bolts. As the bearing wears it may be taken up by removing some of the shims and then tightening the bolts. The bearing on the lower end of the connecting rod may be entirely of bronze or may be a babbitt bearing backed by bronze called sometimes a bronze shell. The babbitted bearing is much softer than the bronze and is much easier to fit. It wears more quickly than a bronze bearing and, consequently, needs to be adjusted oftener. Although the bronze bearing is more difficult to fit, it wears longer and needs less attention. Either type of bearing must have a little side play on the crank pin in order to prevent heating. The length of the connecting rod is from two to $2\frac{1}{4}$ times the stroke of the engine. It is desirable to have it as long as possible.

The Crankshaft.

The crankshaft turns the reciprocating motion of the piston and connecting rod into a circular motion. The length of the crank or the distance from the center of the crankpin to the center of the main bearing is one-half the stroke of the piston, the stroke being the distance the piston moves in one direction in the cylinder. A long-stroke engine is one on which the stroke is over $1\frac{1}{2}$ times the cylinder bore. The longer the piston stroke, the longer the engine crank must be.

When the crankshaft is running at high speeds, there are unbalanced forces set up and these tend to shake or jar the engine. To prevent this, many schemes have been devised for balancing these forces when running.

The Flywheel.

The purpose of the flywheel is to keep the engine running from one power stroke to another. In a single-cylinder engine, power is being delivered by the piston and connecting rod only about one-quarter of the time. Part of this power is stored in the flywheel and given back to the crankshaft and piston, during the other three-quarters of the time. It can be easily seen that a single-cylinder engine requires a heavier flywheel than a four-cylinder engine of the same cylinder size. As the number of cylinders is increased, the weight and size of the flywheel can be reduced. In a great many truck and tractor engines the flywheel and clutch are built together as a unit.

Valves.

It is necessary in a four-stroke gasoline engine that provision be made for getting fresh gases into the cylinder and the burned gases out. This is done by the use of valves, two of which are provided for each cylinder, one for the intake of gas and the other for the expulsion of exhaust or unburnt gases from the cylinder.

The prevailing type of valve is called the poppet mushroom—poppet from its operation, and mushroom from its shape. The valve seat upon which the valve closes is generally found in the cylinder casting, occasionally in the separable head casting of I-head engines, and sometimes in removable cages which carry the seat.

The best materials for valve heads are cast iron, nickel steel, and tungsten steel. Cast iron is comparatively cheap, easily worked, and stands corrosion well. It is weak, however, and a heavier weight is, therefore, required than with other materials. This weight is especially objectionable for high-speed engines. Nickel steel is strong, non-corrosive, and has a very low coefficient of heat expansion. Hence, it does not warp so readily as other metals. It is a rather expensive material and when used is generally welded to a carbon-steel valve stem. Tungsten steel is very hard and will stand high temperatures without pitting. The tungsten valve maintains a smooth tight seat for a long time while cast-iron valve seat will show pits and worn spots after a comparatively short period of use. In some makes of valves, cast-iron heads are fastened to steel valve stems with screw threads, the ends being riveted to prevent loosening in use.

The valve seats are usually bevelled to an angle of 45 degrees, though flat valves with flat seats are occasionally used. The valves must be large enough to let the gases in and out of the cylinders freely. If they are too small they will cut down the power of the engine by not permitting it to get a full charge. The valves usually measure from one-third to one-half of the cylinder diameter. Valve diameters are usually measured by the opening in the valve seat, often referred to as the throat of the valve. The diameter of the inlet and exhaust pipes should at least equal this valve diameter and should be larger if possible.

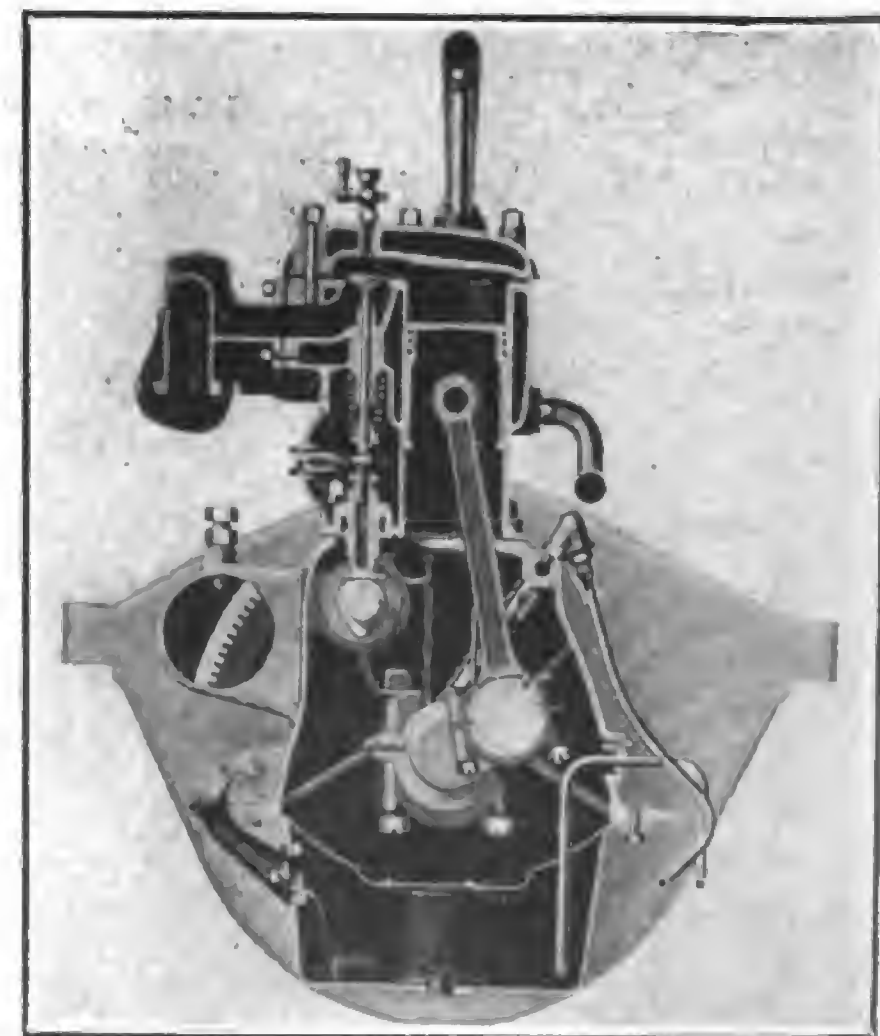
The valve lift, or the distance the valve opens, should, when possible be

sufficient to give the gases as large a passage between the valve and seat as they have through the opening or throat. For a flat valve seat this would require a lift of one-fourth the valve diameter. With a bevelled seat, the gases pass through an opening in the shape of a conical ring having a width of passage equal to about three tenths of the valve diameter. In most stationary engines this lift can be given the valve, but in high-speed engines it would be too noisy. This amount of lift would cause pounding and wear on the cams. It would require very stiff springs to make the valves follow the cams in closing and would be very hard on the valve seats and stems. For automotive engines the valves are made as large as possible and the lift is limited from five-sixteenths to one-half inch.

Any valve needs regrinding into its seat occasionally with oil and some abrasive that does not include emery in its composition. Exhaust valves require this more often than inlet valves, as they become warped and pitted by the hot gases. After a valve is ground in, the push rods should be re-adjusted, as the grinding will lower the valve and reduce the clearance in the valve motion.

Valve Operating Mechanism.

The form of mechanism for operating the valves depends somewhat on the valve arrangement. The valve arrangement, in turn, is determined by the shape of the cylinder head. The usual head arrangements are named from the shape of the combustion space of the cylinder. The T-head permits large valves and low lifts. It requires two valve operating mechanisms and two camshafts, one on each side of the engine. The L-head, with both valves on one side, requires only one camshaft. The L-head does not present so much cooling surface to the combustion chamber and is, therefore a little more economical in fuel than the T-head arrangement. The I-head arrangement has come into quite popular use because it gives a short, quick passage into the combustion chamber and also a simple, compact combustion chamber with a minimum loss of heat to the cooling water. The valve-in-



Continental Red Seal Model 7-R Six-Cylinder L-Head Type Engine Showing Connecting Rod Assembly in Position.

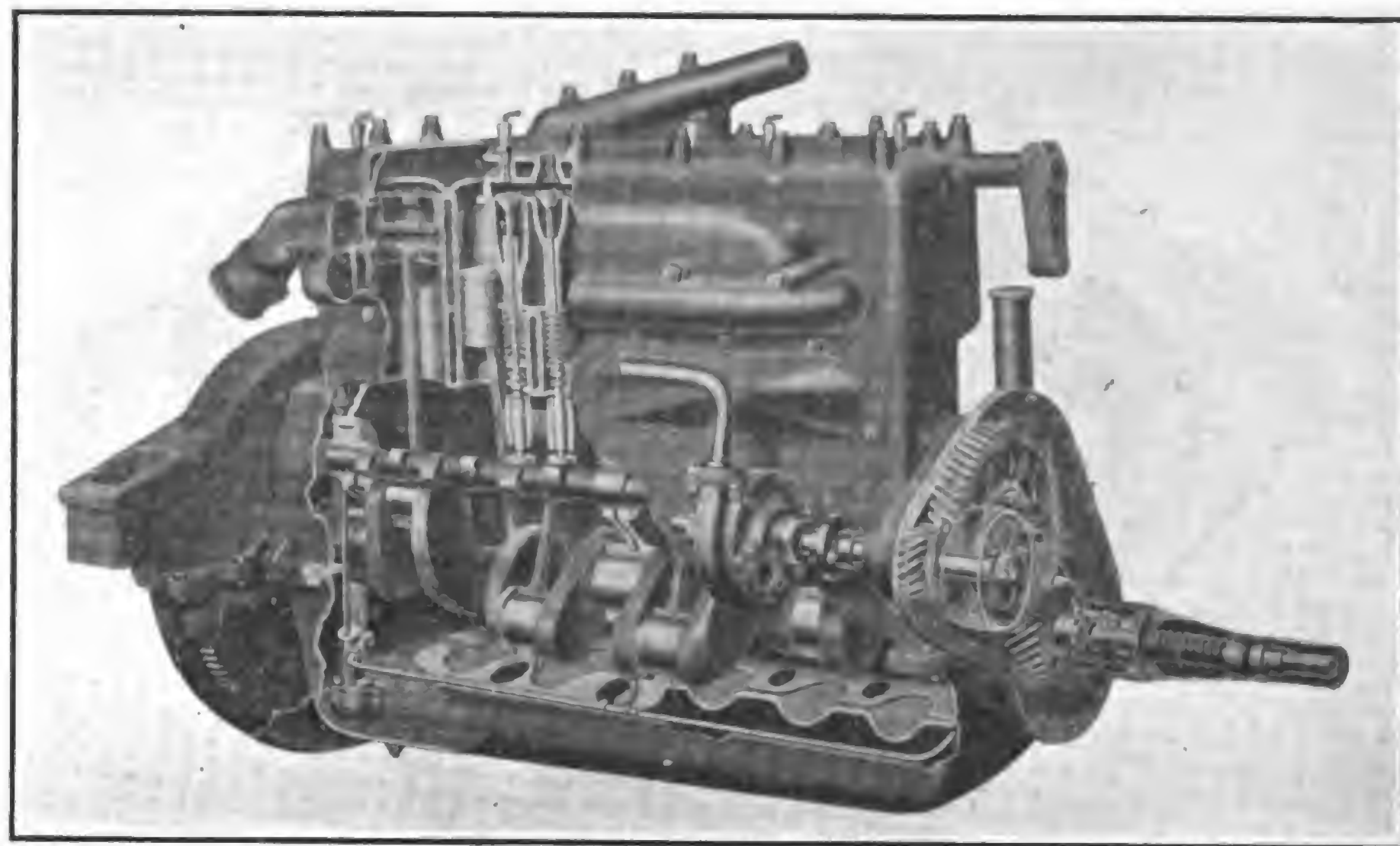
the-head arrangement requires that the motion of the push rod be reversed in order to operate the valves properly. This is accomplished by means of a rocker arm, both valves being operated by one camshaft. With a T-head or L-head valve arrangement, the operation of the valves is simplified.

The valves are operated by two push rods, one for each valve. These push rods receive their motion from the cams. On the lower ends of these rods are rollers or followers, and these roll or slide on the cams of the camshaft. These cams each have a hump or projection for about one-fourth of their circumference. When one of these strikes the roller or follower it raises it, and this motion is transmitted through the push rod to the valve. After the projection of the cam has passed under the roller, the valve spring will close the valve and force the push rod back to its original position. In order to allow for expansion and to provide for certain adjustments in the opening and closing of the valve, there is always a small clearance between the push rod and its follower when the valve is on its seat.

Valve Opening and Closing.

The exhaust valve of an engine opens, on an average, about 45 degrees before the end of the stroke, in order that the pressure may be reduced to atmospheric by the end of the power stroke, and also that there will be no back pressure during the exhaust stroke following. At the end of the exhaust stroke, the exhaust valve should remain open while the crank is passing the center so that any pressure remaining in the cylinder may have time to be reduced to atmospheric. The exhaust valve usually closes from five to ten degrees late (past dead center), having been open from 230 to 235 degrees.

The inlet valve very seldom opens before the exhaust closes. Most manufacturers do not open the inlet until the exhaust closes, for fear of back-firing, although there is little danger of this except with slow-burning mixtures. The inlet



Phantom View Herschell-Spillman Engine.

valve opens, on an average, 10 degrees late (after center). At the end of the suction stroke there is still a slight vacuum in the cylinder and the inlet is kept open for a few degrees past center to allow this to fill up and get the greatest possible quantity of gas into the cylinder. On the average, the inlet valve closes about 35 degrees late, depending on the piston speed of the engine. The inlet valve thus remains open about 205 degrees.

Use of Half-Time Gears.

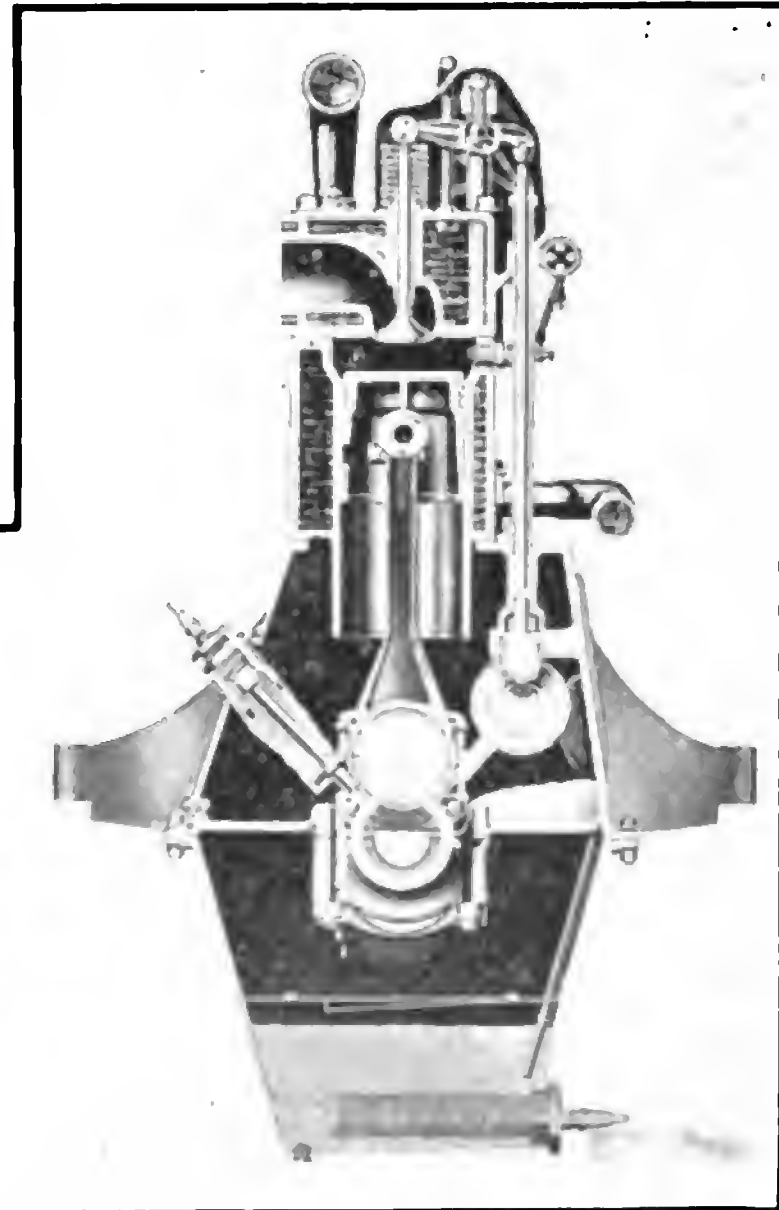
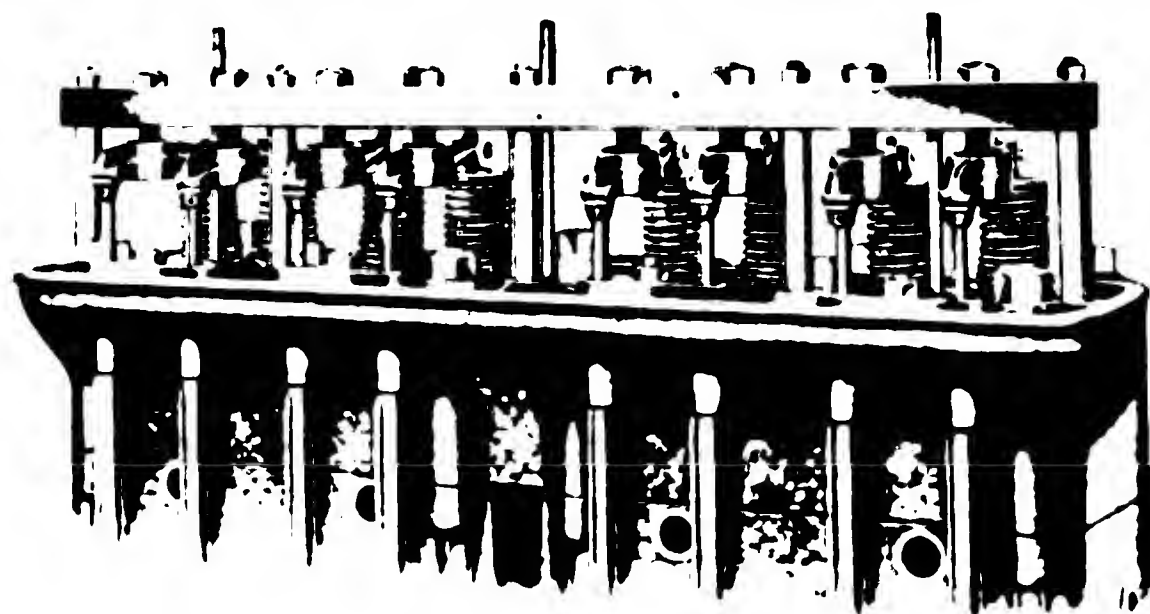
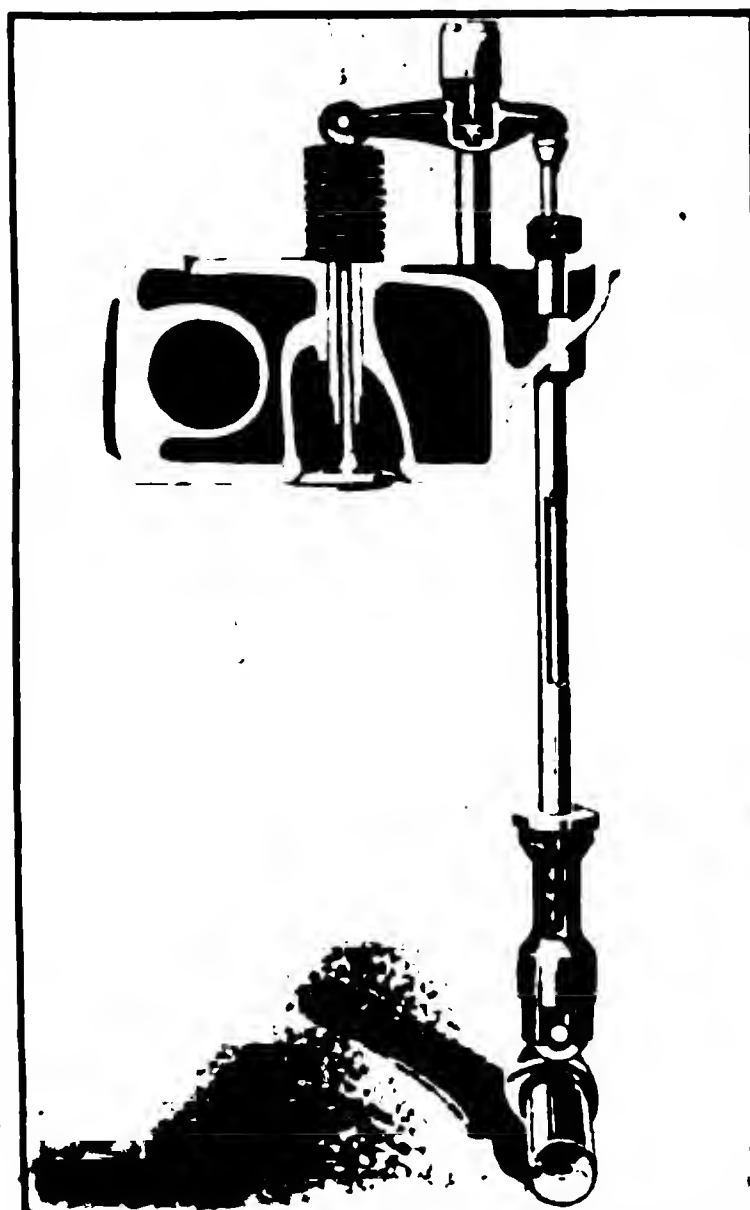
Since the valves on an engine open and close but once in two revolutions, the engine must be arranged so that the cams on the camshaft come around and strike the cam followers only once in two revolutions of the crankshaft. To secure this a gear is put on the crankshaft which drives another gear, twice as large, on the camshaft. The camshaft thus will run at half the speed of the crankshaft. These gears are called half-time gears.

Plain spur gears with straight teeth, or helical gears with teeth at an angle, are the usual types of half-time gears. In some cases the positive connection between the gears is furnished by a chain drive similar to that on a bicycle. Difficulty is sometimes experienced with the plain spur gear on account of lost motion due to wear, and, with the chain drive, to an increase in length. These difficulties have to a large extent been overcome by the use of helical gears.

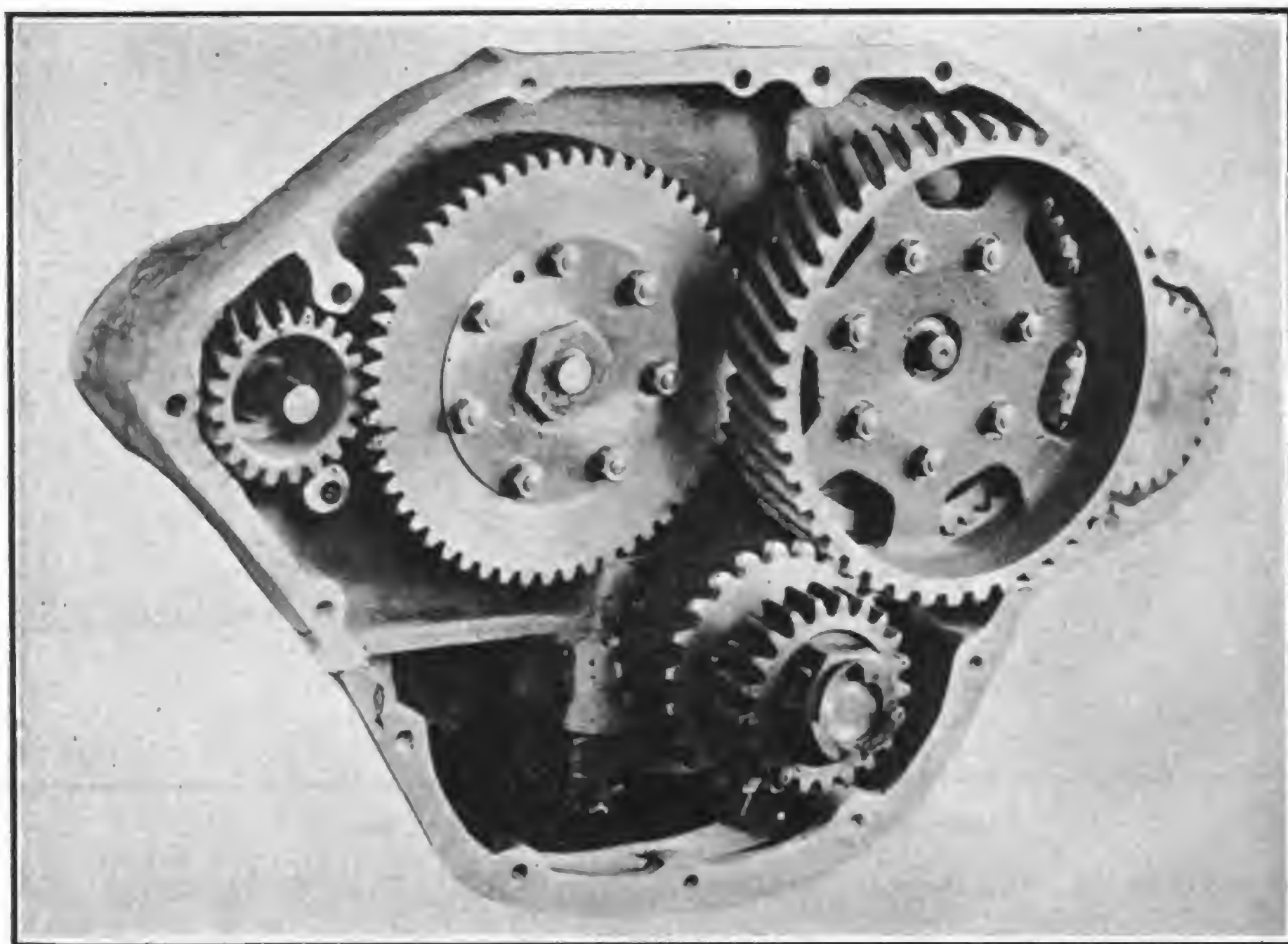
The Muffler.

When the exhaust valve of the engine opens at the end of the expansion stroke the pressure of the gas inside the cylinder is still about fifty to sixty pounds a square inch. The valve must be opened and this pressure let out before the piston starts back, or the back pressure will tend to stop the engine. The valve is opened quickly, and the high pressure, being suddenly released into the exhaust pipe, causes a sharp sound which is heard when an engine exhausts. This sound is not the explosion, as is commonly supposed. The real explosion takes place a little before and can be heard only as a dull thump inside the cylinder. The explosion occurs at the beginning of the working stroke, while the sound heard in the exhaust comes at the end of the stroke. In order to prevent this sudden exhaust from causing noise it is customary to have a muffler. This is a chamber in the exhaust pipe which receives the exhaust gases from the engine and allows them to expand them gradually into the outside air.

The use of a muffler causes a slight



Overhead Valves Showing Operating Mechanism, Rocker Arm Support and Position in Midwest Engine.



Helical Cut Timing Gearset Driving Camshaft, Pump and Magneto and Generator from Crankshaft.

reduction in the power of the engine because the pressure against which the gases must exhaust in the exhaust manifold is increased. A cut-out which permits the exhaust gases to expand directly into the air without going through the muffler can be used wherever the noise is not objectionable or the use of the cut-out prohibited by law.

Cylinder Cooling.

When an explosion occurs inside the cylinder of a gasoline engine, the gases on the inside reach a temperature somewhere around three thousand degrees. The walls of the cylinder are, of course, exposed to this high degree of heat and would get red hot very quickly if some way were not provided for cooling, and the polished surface upon which the piston slides would be ruined very quickly. The most common way of keeping the cylinder cool is by the use of water. The arrangement for this is either through a power-driven, centrifugal water pump attached to the engine, or the thermo-syphon system which depends upon large water jackets around the cylinders and large connecting pipes, connecting the radiator inlet and outlets. Surrounding the engine cylinders is a jacket with a space between for the cooling water. By keeping a supply of water passing through this space, the cylinder can be kept cool enough for the operation of the engine. The cylinder head is also cast with a double wall, especially around the valves, so that these parts will also be kept cool. The cooling fluid is generally water, although sometimes special anti-freezing solutions are used in cold weather where there is danger of freezing. Water should not be allowed to remain in the jacket of the engine over night if there is danger of frost, as the freezing of the water may crack the cylinder. When the supply of water is limited, the water may be cooled in a radiator or system of pipes, and used over again. The water is kept in circulation by a pump or by

the thermo-syphon system and the hot water cooled by the air passing through the radiator.

Meaning of Piston Displacement.

Piston displacement refers to the space swept through by the piston in going from one end of the stroke to the other. It is given this name because the piston through its stroke will either draw in or force out that volume of gas or air. The piston displacement is calculated by multiplying the length of stroke by the area of a circle the diameter of which is the inside diameter of the cylinder. For example, a three and one-half inch by five-inch engine (this means three and one-half inch inside cylinder diameter and five-inch stroke) would have a piston displacement as follows:

The area of a three and one-half-inch circle is 0.7854 times three and one-half times three and one-half which equals 9.621 square inches. The piston displacement is five times this, or 48.105 cubic inches. The clearance of such an engine would be from 24 to 30 per cent. of this.

If we suppose that it is 25 per cent., then the actual space which must be left for the clearance will be 48.105 times 0.25 which equals 12.026 cubic inches.

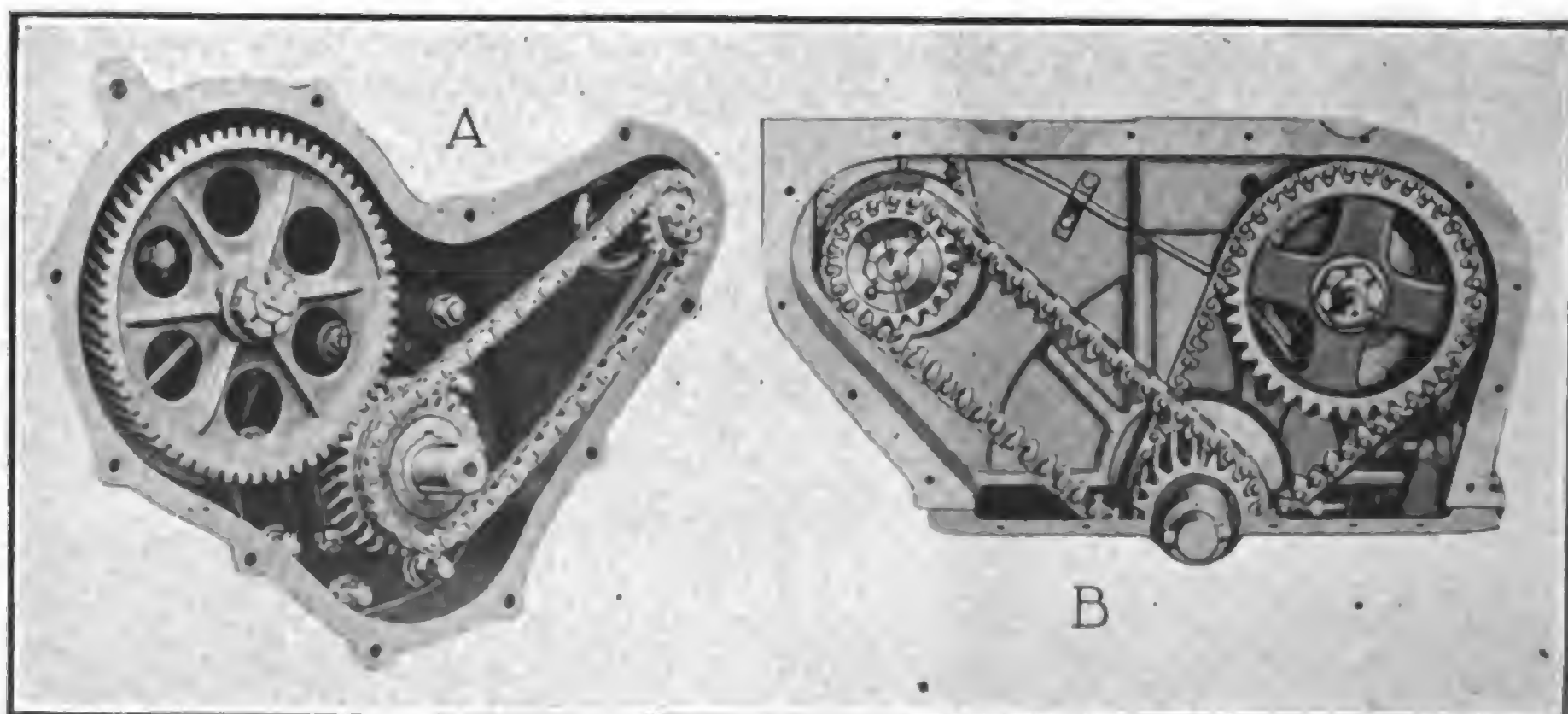
Relation of Compression and Clearance.

It was noted by some of the early inventors of gasoline engines that the compression of a gaseous mixture causes it to give a much more powerful explosion. Consequently, all gas engines draw in a full cylinder charge of gas and air, and then this is compressed into space left at the upper or rear end of the cylinder according to whether the cylinder is a vertical or horizontal type. This space is called the clearance space or combustion chamber. The amount of this clearance space in relation to the whole cylinder volume determines the quantity of gas which is compressed. It has been found from experience that different kinds of gases require different amounts of compression and, therefore, the clearance space is made different for different fuels. The clearance is generally spoken of as being a certain per cent. of the piston displacement, varying from twenty-four to thirty per cent. for automobile and truck engines.

Finding Horsepower of Engines.

The horsepower of an engine is the measure of the rate at which it can do work. One horsepower is a rate of 33,000 foot pounds a minute. There are two ways of measuring engine power. The power developed by the explosions in the cylinder, can be determined in which case what is called the indicated horsepower is given; or a brake can be attached to the flywheel and the power, which the engine actually delivers measured. This is called the brake horsepower. Engines are usually rated by their brake horsepower because that is what they are actually capable of delivering. The brake horsepower of an automobile or truck engine will usually be from seventy to eighty five per cent., of the indicated horsepower, the loss being in the engine mechanism.

There are a number of rules for quickly estimating the power of engines according to their cylinder dimensions and the speed. Those most used for four-stroke engines are given below. The simplest of these and the one most used is known as the S. A. E. or



A, Single Chain Driving Generator, Gear Driving Camshaft, Overland Country Club.
B, Double Chain Drive from Crankshaft, Driving Generator and Water Pump and Magneto.



Typical Muffler Construction, Baffle Plates So Arranged That Burned Gas Passes Through Freely.

formula adopted by the Society of Automotive Engineers.

Derivation of the S. A. E. Horsepower Formula.

The indicated horsepower of a single-cylinder, four-stroke engine is equal to the mean effective pressure, P , acting throughout the working stroke, times the area of the piston, A , in square inches, times one-quarter the piston speed, S , divided by 33,000, thus:

PAS

Indicated Horsepower equals $\frac{PAS}{33,000 \times 4}$

Multiplying this by the number of cylinders, N , gives the indicated horsepower for an engine of the given number of cylinders, and further multiplying by the mechanical efficiency of the engine, E , gives the brake horsepower.

Therefore, the complete equation for brake horsepower reads:

PASNE

Brake Horsepower equals $\frac{PASNE}{33,000 \times 4}$

The S. A. E. formula assumes that all motor car engines will deliver or should deliver their rated power at a piston speed of 1000 feet a minute; that the mean effective pressure in such engine cylinders will average 90 pounds a square inch; and that the mechanical efficiency will average 75 per cent.

Substituting these values in the above brake horsepower equation, and substituting for A its equivalent, $0.7854D^2$, the equation reads:

Brake Horsepower equals

$$\frac{90 \times 0.7854D^2 \times 1000 \times N \times 0.75}{33,000 \times 4}$$

and combining the numerical values it reduces to:

D2N

Brake Horsepower equals $\frac{D^2N}{2.489}$

To make it simpler, the denominator has been changed to 2.5 without materially affecting the result.

The formula can be simplified, however, for ordinary use by considering the number of cylinders; thus for the usual four, six, and eight cylinder engines it becomes:

1.6 D. equals the horsepower for all four-cylinder engines.

2.4 D2 equals the horsepower for all six-cylinder engines.

3.2 D2 equals the horsepower for all eight-cylinder engines.

4.6 D2 equals the horsepower for all twelve-cylinder engines.

The S. A. E. formula comes very close to the actual horsepower delivered by any automobile or truck engine at the piston speed of 1000 feet a minute. However, at the present time, most of the engines will deliver the maximum power at speeds higher than this, usual-

ly around 1500 feet a minute. As a result, the power which the engines are capable of delivering is greater than that given by the S. A. E. formula. The formula will serve, however, as a means of comparing engines on a uniform bases.

Observe Common Rules of Road

REGARDLESS of repeated instructions and warnings concerning safe driving, every year sees its toll in dead and injured because drivers either forget rules or err through ignorance or just plain incompetency. The ordinary rules of the road are simple enough to follow, but some drivers insist upon acting on a code of their own and disregard those made for the safety of all the users of the road. One of the common causes of accidents is due to neglect to observe the well established rule relating to crossings. All crossings ought to be considered potential danger points. If you cannot see, or if you do not get a horn signal from a car likely to cross your path, do not take it for granted that no car is there. Look out for everyone else and you will be looking out for yourself.

On a wet road skidding is the most dangerous thing likely to happen, but skidding becomes dangerous only if the car is traveling at high speed. A slow running car can easily be stopped; or even if it does not stop when the brakes are applied, at least the impact does little if any harm. Without tire chains, brakes equally adjusted or other assurance that the car will stay straight on a wet road, do not take the chance. Regardless of safety devices, drive slowly, apply the brakes intermittently, not harshly. If you know the car is a chronic "skidder," reduce the liability as much as possible by shifting into second speed. If there is not time to shift into second, or if you "lose your head," you are at fault. Learn to control a car that is skidding. The rule is, steer with or in the direction of the skid, so as to straighten out the car if possible. The average motorist forgets everything and presses as hard as he can on the clutch and brake pedals. Use the brakes alone and look ahead with a view to keep the car from striking an object.

How many times will one see cars on the road with their windshields fogged with rain, the drivers hurling the car through the storm with no thought of possible danger. Keep the windshield clear of rain, if possible, or, better still, purchase a rain cleaner that will clear a space directly in front of the driver on the shield, so that he may see plainly the road over which he is driving. Many accidents have occurred due to fogged windshields, so that an owner who permits his chauffeur to drive under such conditions is negligent in case of accident.

In going down steep grades use the engine as a brake by shifting into second or first speed. Shut off the ignition, if you wish to increase the braking power

of the engine, as you can easily switch it in again at the bottom grade. This method saves the brakes and simplifies the control of the car on a hill. Do not try to make every grade on high gear, driving the car at the limit of its speed. Remember there are other users of the road as well as yourself. At night think of the glow of your headlights. Do not confuse the oncoming driver with bright lights. Pass him with dimmers on. Keep as far to the right as you can and drive slowly so as to avoid bewildering the other driver. Your statement that you were not as close to him as he claims will not repair bones or save lives.

DO NOT REDUCE AIR PRESSURE IN SUMMER.

A warning to drivers against reducing the air pressure in their tires during hot weather is now particularly opportune. This fallacy is common among motorists who do not understand that radiation carries off the surplus heat generated by the tires in their contact with the road surface, that might otherwise be disastrous to the tire.

Even during the terrific grind of the race track, when tires undergo the most gruelling punishment, this principle holds. It is under-inflation during the hottest days that ruins more tires than any other cause, according to experts. Air pressures recommended by manufacturers are safe even in the summer.

By reducing the pressure the increased flexing of the tire creates a condition which the car owner should guard against. The driver can well afford the time spent in gauging the air pressure in his tires frequently for the sake of the greatly increased mileage.

SIMPLE METHOD OF GETTING CAR OUT OF THE MUD.

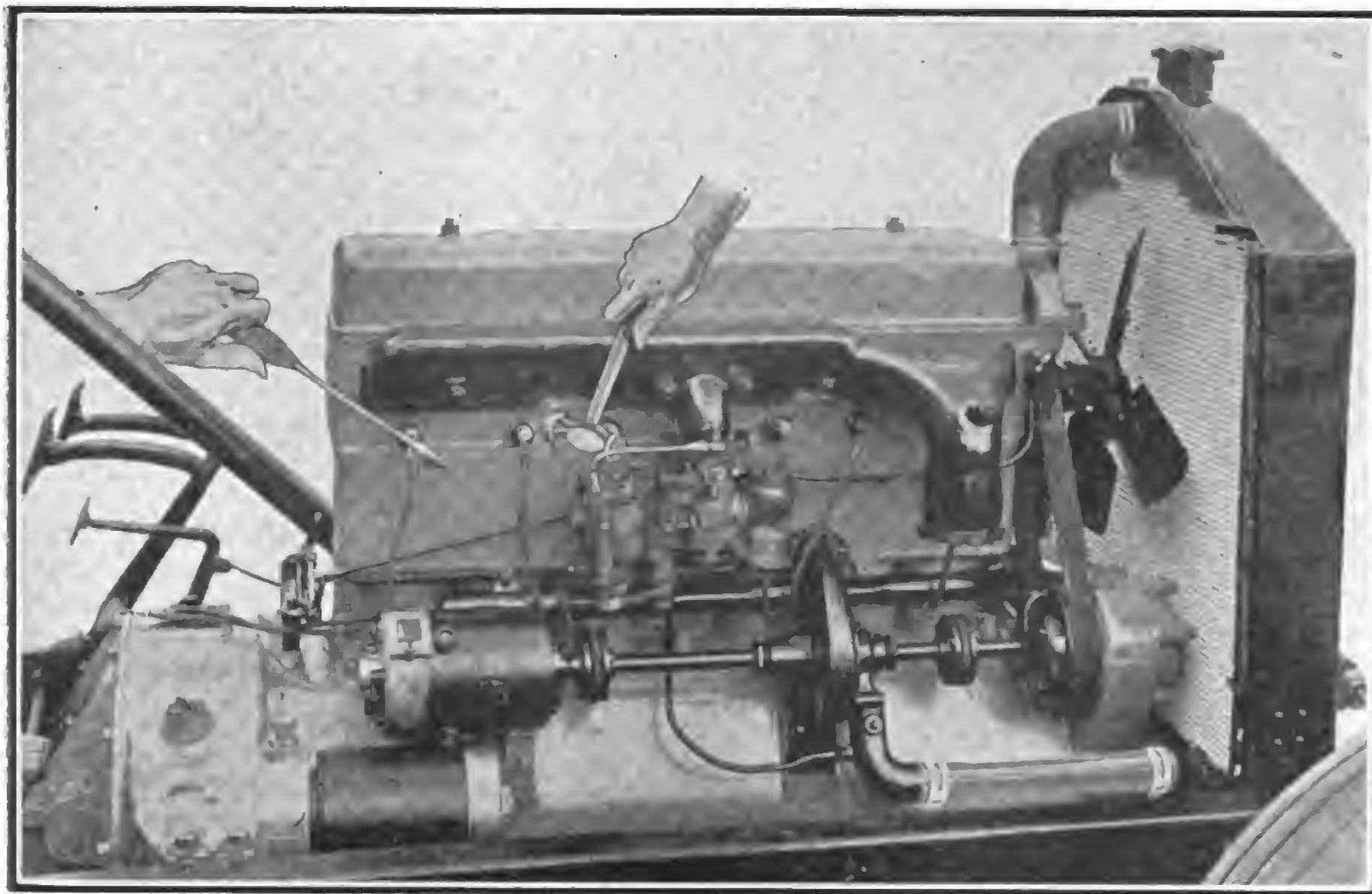
The next time the car gets stuck in the mud a trial of the following method is recommended: Procure a board or plank about four or five feet long and a length of rope. Force the plank under the wheel as far as it will go, attach the rope at the outer end, drawing it taut and fastening it to the nearest spoke of the rear wheel. When the car is started the rope will pull the wheel up on to the plank, giving it a sure footing for a fresh start.

IGNITION TROUBLE.

Most of the ignition coils on the market are adapted to the voltage obtained by using a six-volt current either from a generator or storage battery. The connecting of two or more coils in series in order to secure greater efficiency is very likely to burn out the condenser and ruin the coils.

A not infrequent cause of hard starting is over-richness of the mixture. When this is suspected the driver had best stop trying to start for a few minutes, when the excess gasoline will have evaporated and then very probably the engine will start at the first pressure of the button or turn of the crank.

TRACING TROUBLES BY ELIMINATION



Short-Circuiting Plugs to Detect Missing Cylinders.

IT HAS been estimated that about nine-tenths of the troubles that occur in gasoline engines can be traced directly to some defect in the electrical system of the car. The other one-tenth is traceable to carburetor defects, a plugged fuel line, poor valve action, or weak compression.

Often a car is brought to the service station with practically nothing wrong with it except a slight skip in one or more of the cylinders. What is the result? The car is turned over to a repair man and, in many cases, considerable time is taken to locate the skip. The trouble may then not be found and the engine still skips when the owner takes it away. He naturally becomes dissatisfied and may try another service station, where the repairers are perhaps better posted, and the skip is located and eliminated in short order. The question naturally arises, why did the first repair man fail to find the trouble,

while the second located it almost at once? The answer is simple, for the first worked without system and apparently looked everywhere but in the right place for the trouble, while the second soon found it by the simple and systematic process of elimination.

Systematic Search Necessary.

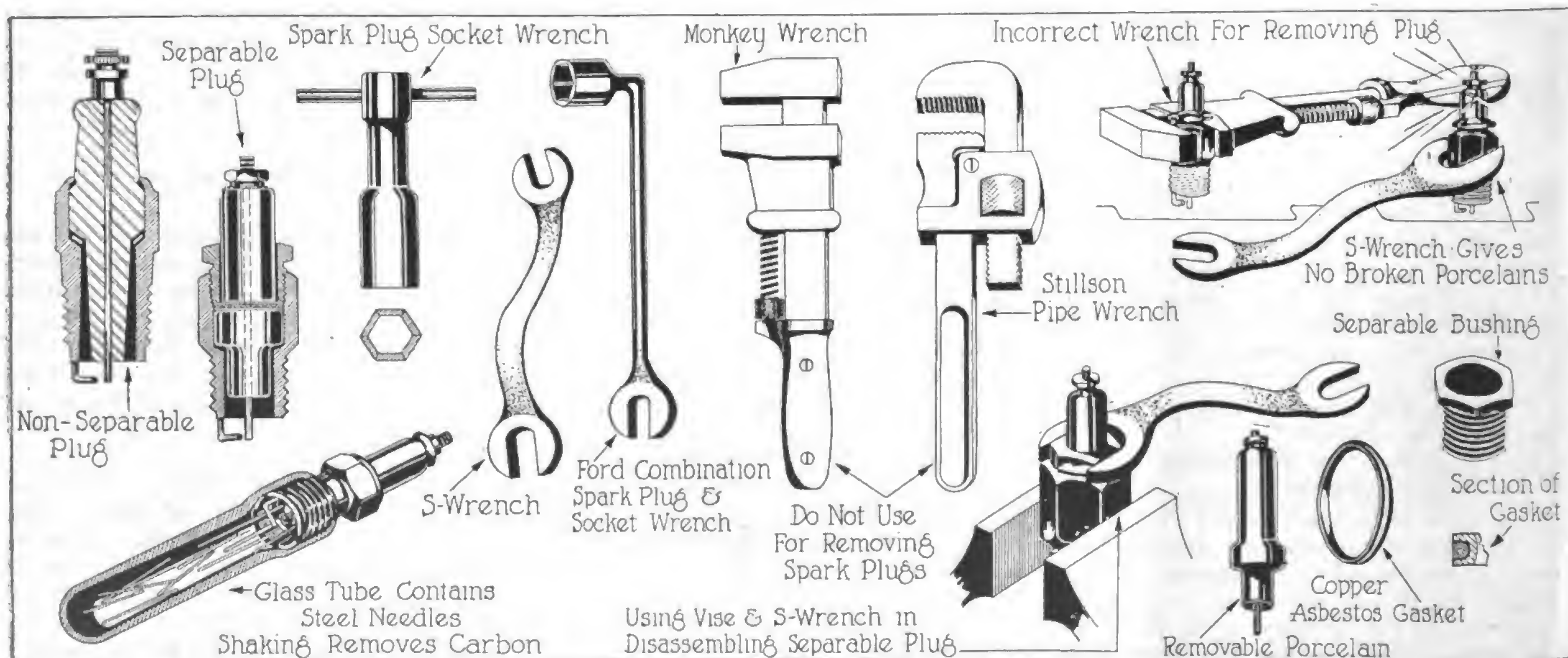
In tracing trouble in either a passenger car or a truck, the repairer who proceeds in a systematic manner, eliminating the units which are found, when tested, to be all right, will have no difficulty, while the mechanic who wanders aimlessly from one unit to another without any definite plan in mind will have difficulty in locating the trouble.

In the case of a skip in the engine three things may cause the trouble. The first and foremost is the electric ignition system; the second the fuel line, and the third the carburetor. The carburetor is considered last for the reason that this unit should not be disturbed

until the other two have been tested and eliminated. The adjustment of the carburetor cannot change through the vibration of the engine unless the locking nuts have carelessly been left loose. Again, if it has been working properly up to the time that the skip started, it is probable that the adjustments are correct.

Test Ignition First.

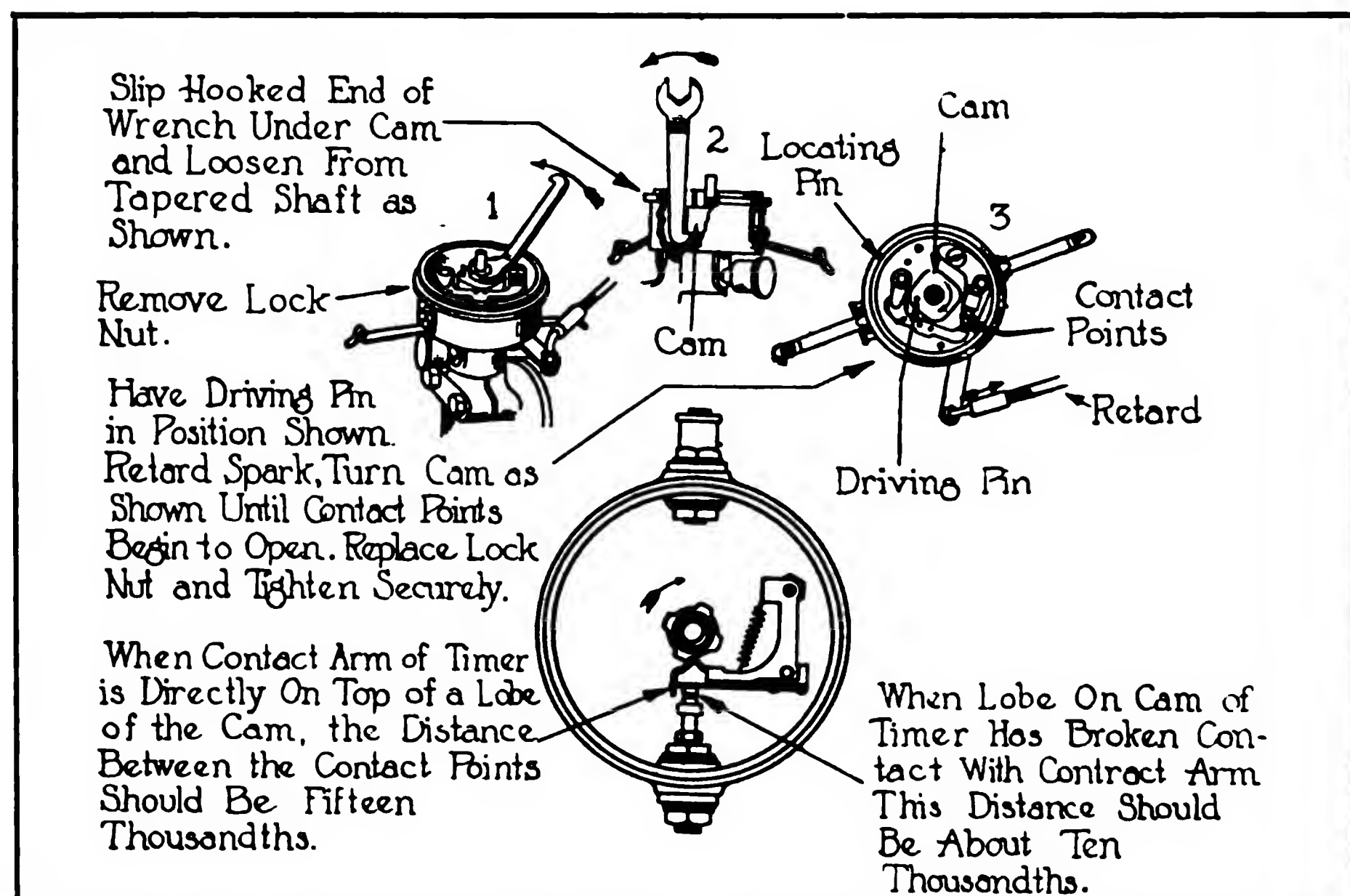
The mechanic should first test the ignition of the engine cylinders, two at a time, either with a screw driver having an insulated handle or a screw driver and hammer, short-circuiting the plugs to cut out the cylinders and noting from the sound of the engine if the other two cylinders are firing regularly. This method should be followed with the other cylinders and if the engine is a six, the third set in the same manner. If there is any doubt, the doubtful cylinders should be tested again, or the plugs should be removed. Carbon deposits may be found inside the shell of the plug, the porcelain may be cracked or the points may not be properly spaced. The carbon accumulation should be cleaned out with a sharp knife or, if the plug is of the separable type, it should be disassembled, cleaned with a cloth and soaked in gasoline or kerosene. The porcelain should never be sandpapered or scraped with a jack-knife, as it is glazed and the knife or rough paper will cut the glazing, causing it to collect carbon faster the next time. The plug again should then be reassembled, the points set to 1/32 inch and the plug screwed into the cylinder. Testing with screw driver and hammer again will determine whether the plug is firing or not. If the porcelain is cracked or otherwise damaged, it will be necessary to fit a new plug. If, after testing and examining the plugs of the cylinder or cylinders that are not firing, you are sure they are correct, the trouble will have to be sought for elsewhere.



Cleaning Spark Plugs, Showing Correct and Incorrect Method of Removal and Wrench That Should and Should Not Be Used.

Examine the high-tension wire terminals leading from the distributor case to the plugs that are not working. Possibly a leak may occur between the inner wire through the insulation to a metal conduit which carries the wires to the engine. This is rather difficult to locate in the day time but, by pulling the wires from the tube and allowing them to lay apart on the outside, tests can be made which will show if they are causing the trouble. If the engine runs on all cylinders after this is done the repairer can be sure that he has located the trouble, and all that will be necessary then will be to supply a new high-tension wire in place of the one found defective.

If, however, the trouble is not located here, the next step is to remove the distributor cover and examine the breaker points under the rotor arm. The rotor arm slips off the top of the shaft easily and allows easy access to the breaker box. Oil in the interior of the distributor may cause a skip in the engine. If the points are dirty, burned or pitted, they require cleaning, truing up and adjusting. Clean distributor cover inside with soft cloth to remove oil. If the lower point is burned excessively a new



Disassembling Breaker Box and Showing Correct Method of Adjusting Points.

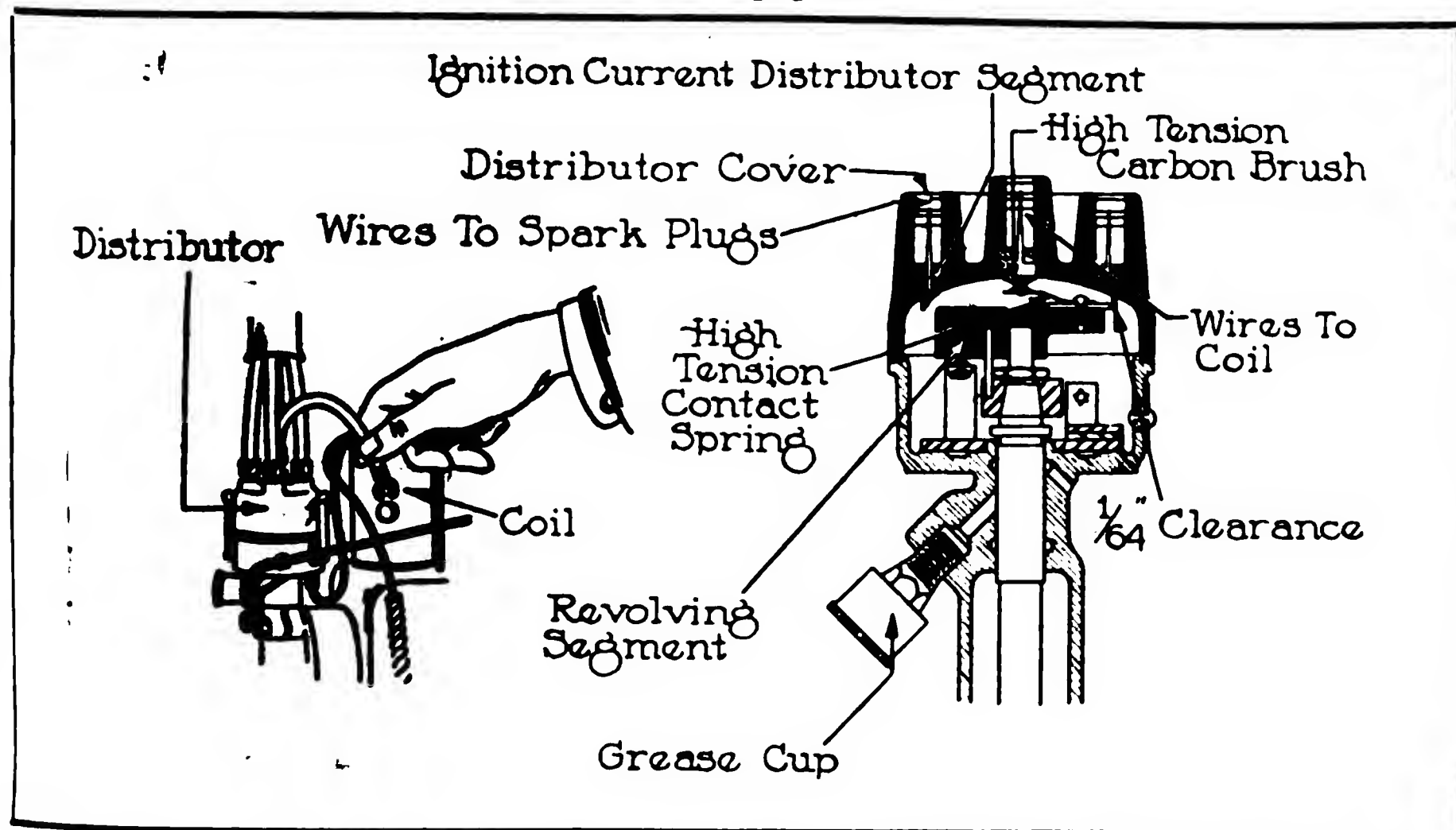
clear about .020 to .025 of an inch, or about the thickness of a piece of writing paper.

step is to examine the fuel line, as dust or lint may have worked through the main tank and fouled the screen which is placed in the fuel pipe to prevent its passage into the carburetor.

If a vacuum tank is used in the line, remove the pipe which connects the tank at the top. This pipe leads to the main tank in the rear and draws the gasoline from the main tank into the vacuum tank by the operation of the engine.

Remove the small screen under the pipe connection and clean. Replace the screen and connect the fuel pipe, taking care not to strip the threads of the connection. Where the fuel pipe which leads from the vacuum tank connects to the carburetor, on some cars will be found another screen as an additional safeguard to prevent sediment from entering the carburetor. This screen is found more particularly on eights and 12s, but may also be found on sixes. Loosen the connection remove the screen and clean with gasoline or kerosene. Replace again and tighten the connection.

It is a good plan to blow back through the connecting pipe to see if the pipe is clear. If this cannot be done readily, disconnect the opposite end and blowing

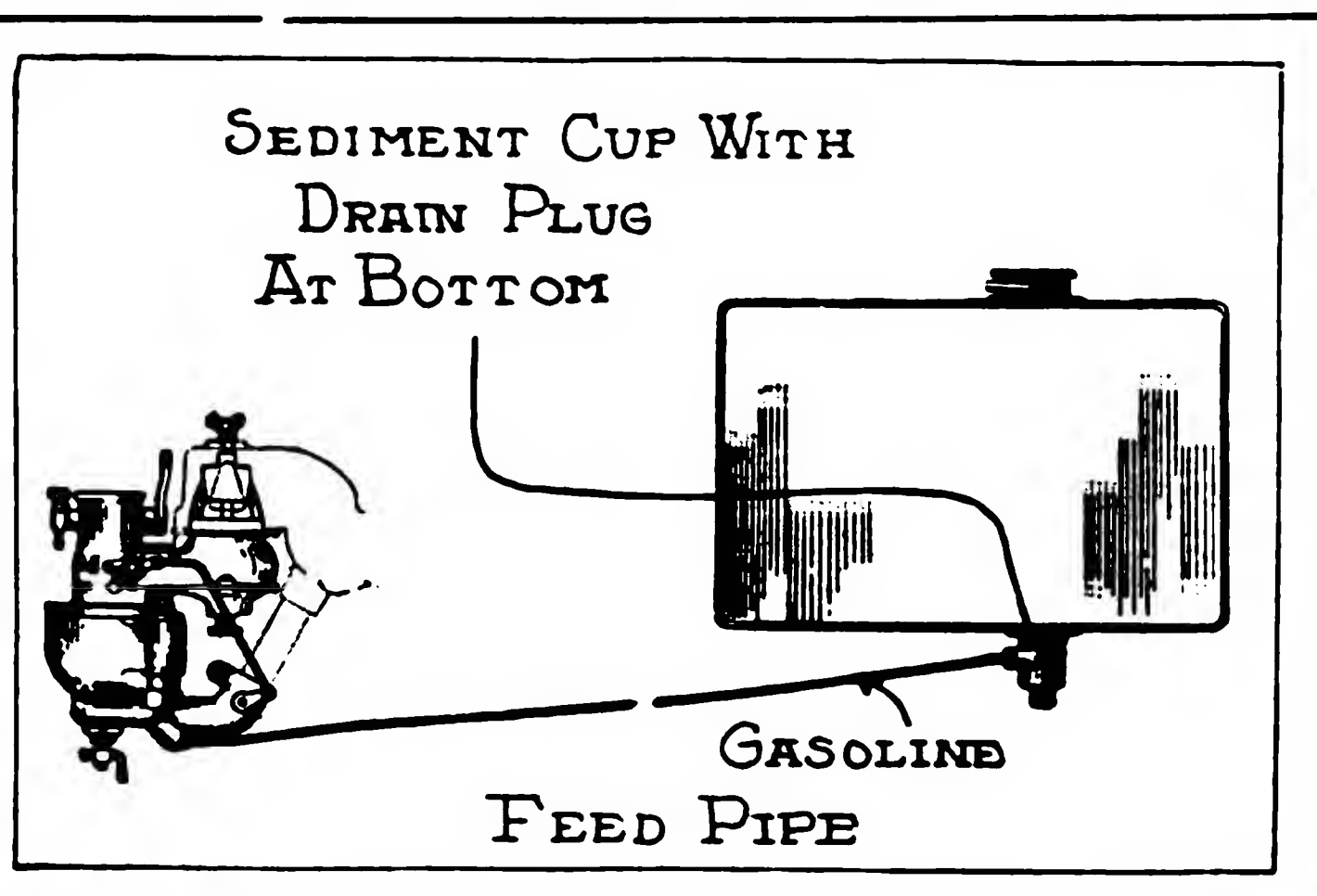
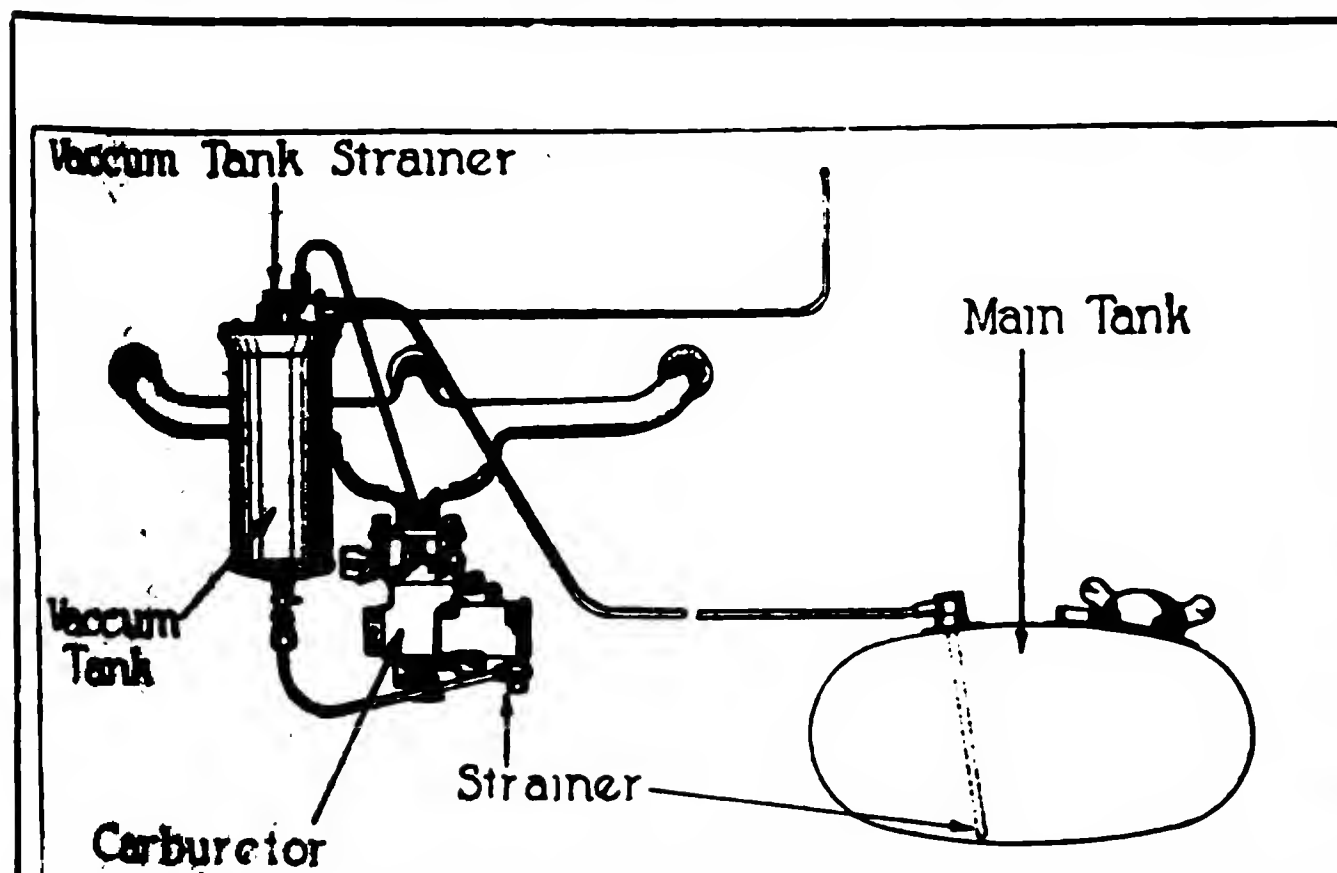


Left: Method of Testing Spark Between Distributor and Coil; and Right, the Proper Clearance Between Points.

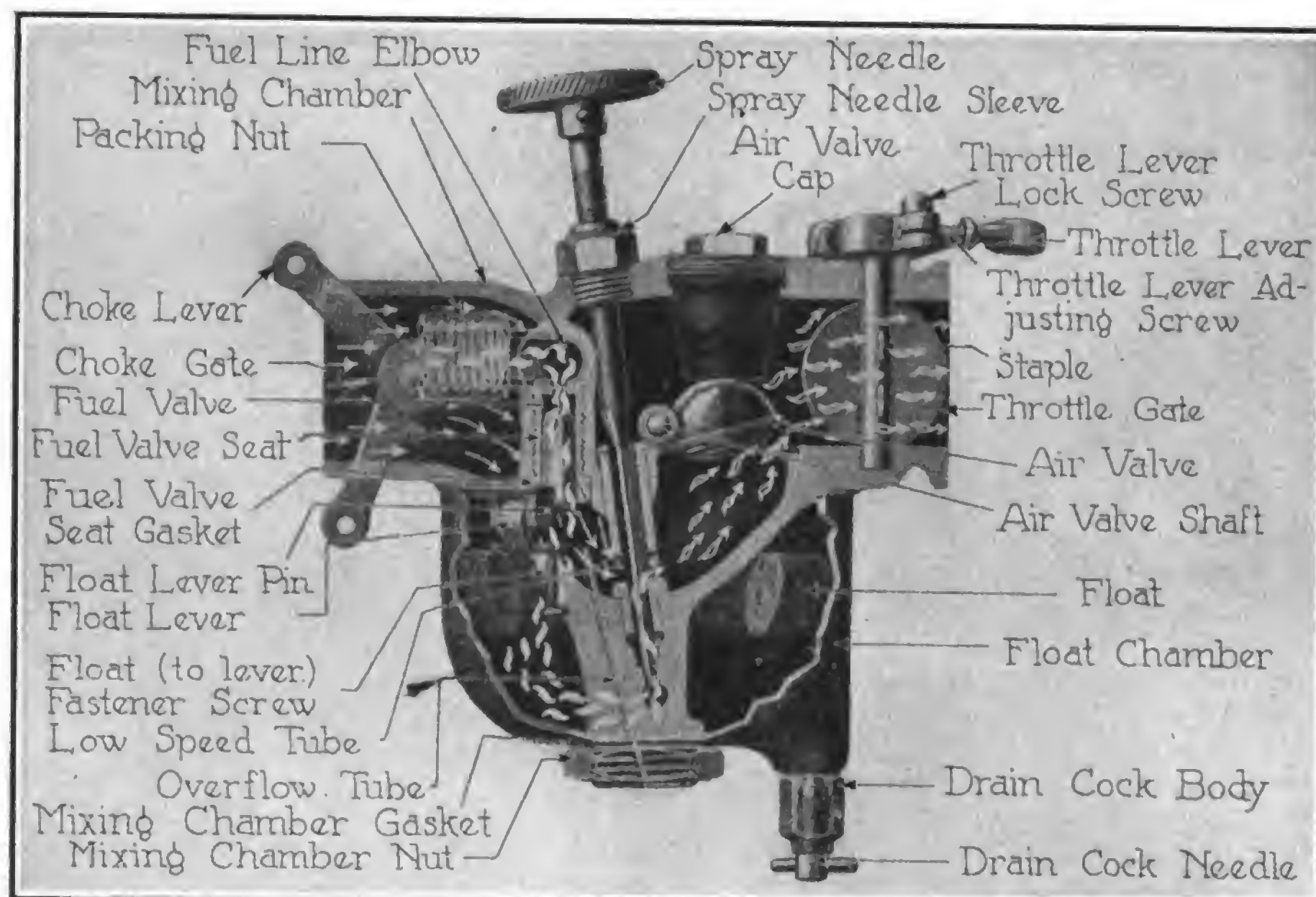
one should be soldered to the arm to make the contact perfect. Oftentimes a skip that is difficult to locate will be found here. The points should be set to

Examine Fuel Line.

If the trouble is still present after testing by running the engine and noting how the cylinders are firing, the next



Left: Typical Vacuum Tank Fuel Feed Installation, Showing Location of Strainers. Right: Gravity Feed Fuel System, Conventional Type Used on Many Low Priced Cars.



Ford Carburetor, Puddle Type, Used on Late Models.

or running a wire through will remove any accumulation in the pipe.

Testing Carburetor Adjustments.

After the connections are remade, test the engine by running and note if the skip is still present. If it is noticeable, it is safe to assume that the trouble is probably due to the improper adjustment of the carburetor. Up to this point it has not been necessary to race the engine to eliminate the skip. To test the carburetor adjustments this may be necessary, but the repairer is cautioned that racing of the engine should be avoided whenever possible, as it will eventually lead to troubles of greater consequence, such as loose bearings, noisy engine, etc.

Carburetors vary as to the number of adjustments found upon them. Simple puddle type carburetors, such as are used with the Ford engine, are fitted with

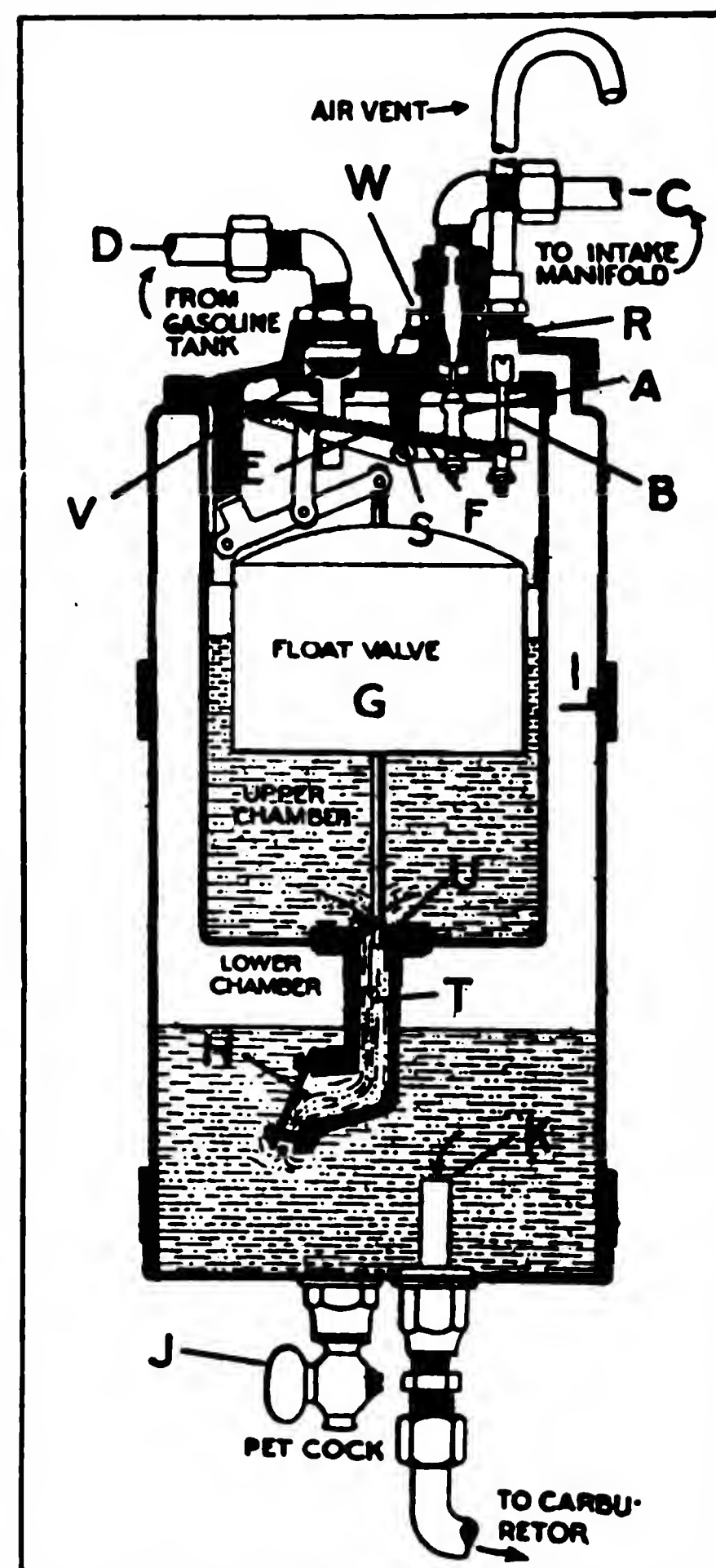
only one adjustment, the needle valve, which gauges the amount of gasoline admitted to the venturi tube, where the gasoline mixes with the air and passes on through the intake manifold to the combustion chambers of the engine.

Still other types, such as the Marvel, Schebler, etc., use an air adjustment which gauges the amount of air taken in through the air inlet, while a third type, such as the Rayfield, uses three adjustments.

Such carburetors as the Zenith, Stromberg and several of foreign make do not use a needle, but fit spray nozzles having fixed openings, which allow a certain amount of gasoline to flow at certain speeds. Two or more jets are supplied, the extra jets coming into operation as the speed of the engine increases. Carburetors of the puddle type may be

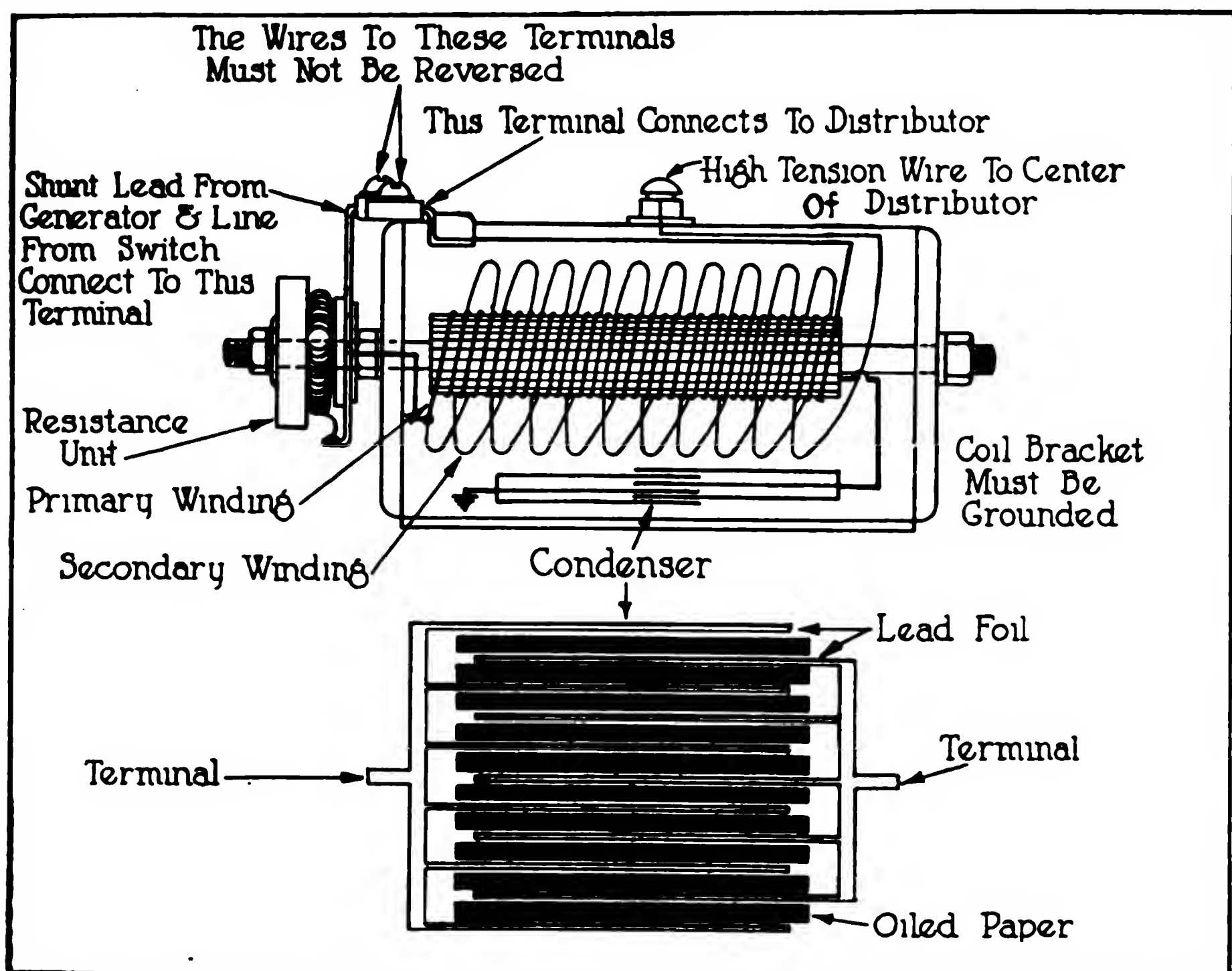
tested by screwing in the needle valve until the valve seats and the engine stops. Unscrew the needle valve $1\frac{1}{2}$ turns, start the engine and gradually turn the valve until the engine idles properly and seems to accelerate slightly as the mixture reaches the correct density. Allow sufficient time for the engine to take the gas from the intake manifold before noting the difference in the speed of the engine. Test the engine and set the carburetor only when the engine is warm, for if the carburetor is set with the engine cold, the operation will not be the same when the engine warms up.

Carburetors similar to the Marvel, used on the Buick car, have two adjustments, one for the needle valve and the

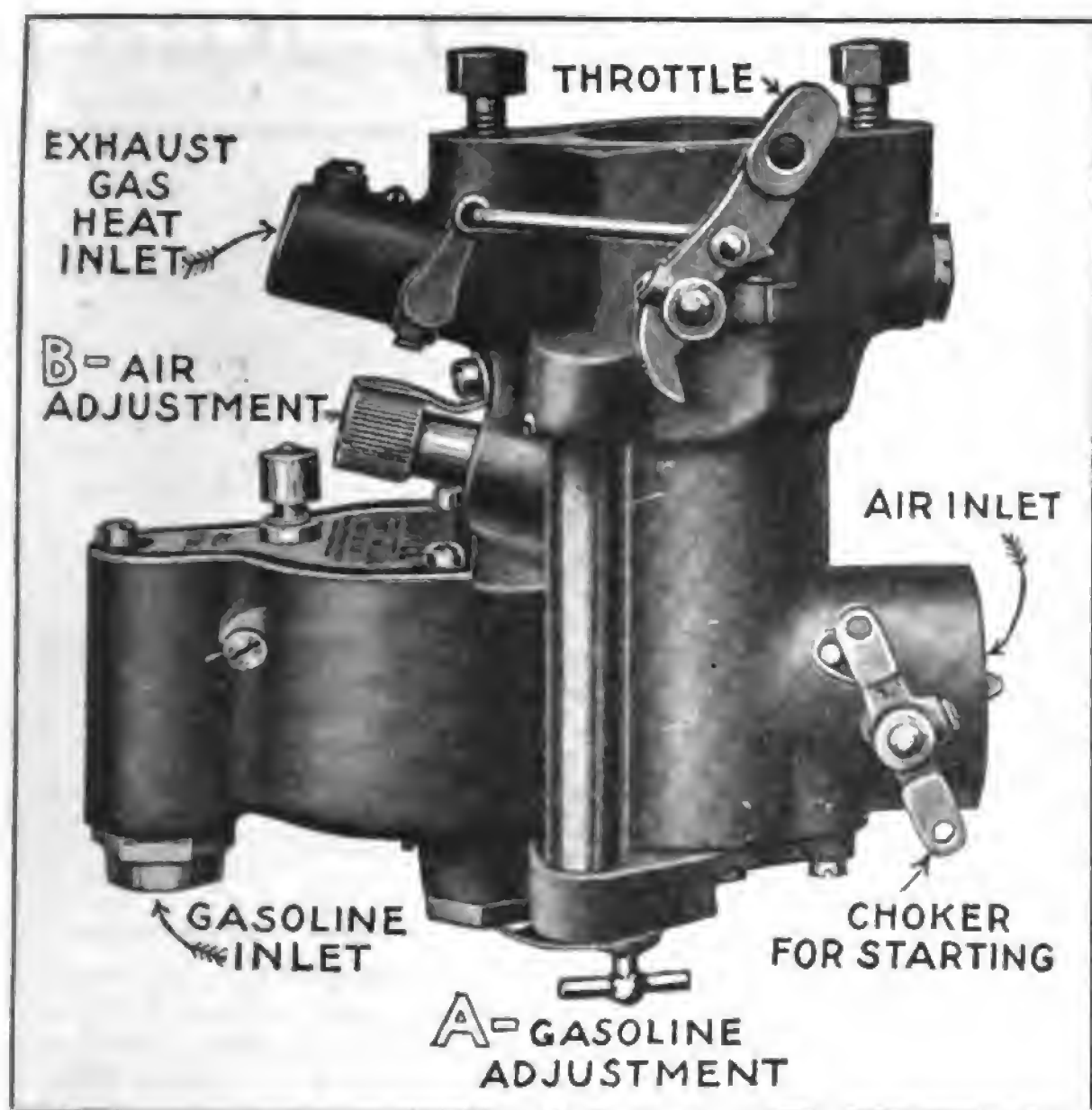


Sectional View of Stewart Vacuum Tank, with Components Clearly Indicated.

second for adjusting the tension on the air shutter in the air inlet. The needle valve adjustment is used for low or idling speeds and the air adjustment for acceleration and high speeds. To adjust the needle valve, if there is doubt as to its setting, turn the valve down to the right till it seats and the engine comes to a stop. Open the needle valve about $1\frac{1}{2}$ turns, start the engine and turn the valve first to the right and then to the left until the engine runs smoothly without skipping and the engine seems to accelerate slightly or pick up. This is the correct point for setting the valve and to prove whether it is right for idling, fully retard the spark and throttle. The engine should idle smoothly without skipping or showing indications of stalling.



Usual Coil Construction, Showing Location of Condenser and Method of Construction.



Marvel Carburetor Indicating Adjustments.

If the engine runs too slowly for idling, adjust the butterfly opening of the throttle by screwing in the adjusting screw on the butterfly arm till correct idling speed is obtained; the engine should not race, neither should it run so slowly that it will stall.

When the engine is found to idle properly, the next step is to set the second adjustment for acceleration. This is accomplished by advancing the spark from one-half to two-thirds the distance on the quadrant and grasping the accelerator rod with the hand, opening and closing quickly the throttle or butterfly valve in the carburetor intake. If the engine accelerates freely without back-firing, the high-speed adjustment is correct. This may be determined after three or four trials in succession. If, on the other hand, the engine back-fires into the carburetor, the high-speed adjustment will have to be changed and this is done by tightening the tension on the spring by means of the knurled nut at one side of the carburetor above the bowl of the spring. The adjusting nut mentioned connects with one end of this spring while the other end fits a coned point on the top center of the hinged cover. Additional tension applied to the coil spring cuts down the flow of air through the air intake at high speeds, preventing the popping back into the carburetor when the engine is accelerated. This adjustment can be made to a fine point by means of the adjusting screw mentioned above.

Carburetors of the type of the Zenith, Stromberg and several others of foreign make, instead of using a needle valve to govern the flow of gasoline, have spray nozzles or tubes with fixed openings. One is used for idling speeds while the second comes into action when the speed of the engine reaches a certain point. Several sizes of nozzles are made by the manufacturers of these carburetors in millimeter sizes, and if it is found necessary to change to a smaller or larger size, this can be accomplished by un-

screwing the nozzle and replacing with another size. This is usually unnecessary as the correct sized nozzles are fitted to the carburetor when the engine is tested at the factory.

Troubles that occur with this type of carburetor are generally those caused from particles of dust working up into the small end of the nozzles, plugging the openings and preventing the passage of gasoline. Below the nozzle in the casting of the carburetor will be found two small hexagonal bronze studs; removing either of these will allow the repairer to run a wire up through the nozzles, forcing out any particles that may have lodged at this point. As the gaso-

line is pretty thoroughly strained through fine screens in the fuel line, the possibility of these particles finding their way into the nozzles is a remote contingency.

Careful attention to details in making the systematic search will in the end result in the definite location and repair of the trouble. Considerable time will be saved for other work and the car owner will be satisfied, as his car will again be running properly.

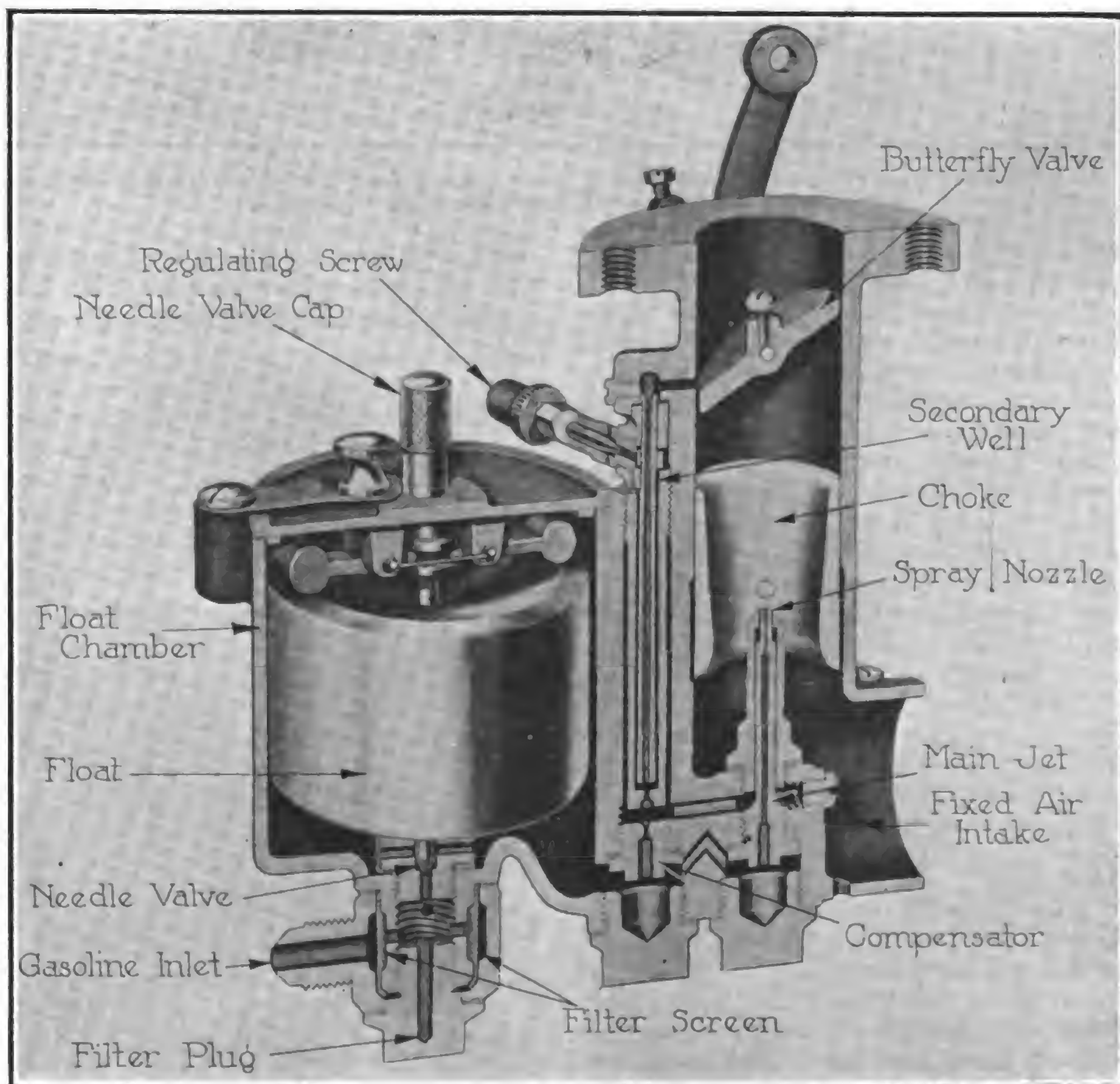
TO REPAIR BATTERED THREADS ON AXLES.

In removing the wheels from semi-floating type axles the repairer will sometimes hammer the end of the axle in loosening the wheel, battering the end of the axle to such an extent that the castellated nut will not readily go on. To remedy this turn the castellated nut and screw it to the axle with the castellated end first. The threads of the nut will act as a die and will cut the threads of the axle, the chips falling out through the castellated openings at the side. Reversing the nut again it will be found that the nut fits the thread easily.

HOME-MADE TOWING DEVICE.

In case of accident where it is necessary to tow the car, procure a 10-foot length of pipe, one inch in diameter. Thread a 14-foot length of chain through the pipe and attach two snap catches at each end of the chain. Slip a section of rubber hose over the chain and snap hook, nearly to the end of the pipe. The hose is to prevent the chain from marring the part of the car to which the towing device is attached, while the pipe will keep the towed car from running up too close to the towing car and damaging it.

Often the brakes of the towed car become inoperative. This device will allow such a car to be towed to the garage with safety to the operator and the towing car.



Zenith Model "L" Carburetor Equipped with Fixed Spray Nozzle and Secondary Idling Well.

EV-R-GREEZD, A PROVEN UNIVERSAL JOINT

THE Noyes-Richards Engineering Co. Boston, Mass., does not claim that the new Ev-R-Greezd Universal Joint which is now attracting so much attention from engineers of the automotive industry, will run forever without lubrication. It has ample proof, however, to convince the most sceptical that it needs attention at the most but once a year.

This company, true to its usual policy, has not offered the newly patented joint to the trade until its true worth has been proven by exhaustive tests which for more than a year have been made on various makes and kinds of motor vehicles. Throughout all experiments the joint has proven capable of all that was expected of it, whether in use on a heavy duty truck, or a light pleasure car. It is stated that several of the largest manufacturers of automotive vehicles are to adopt it as a standard equipment.

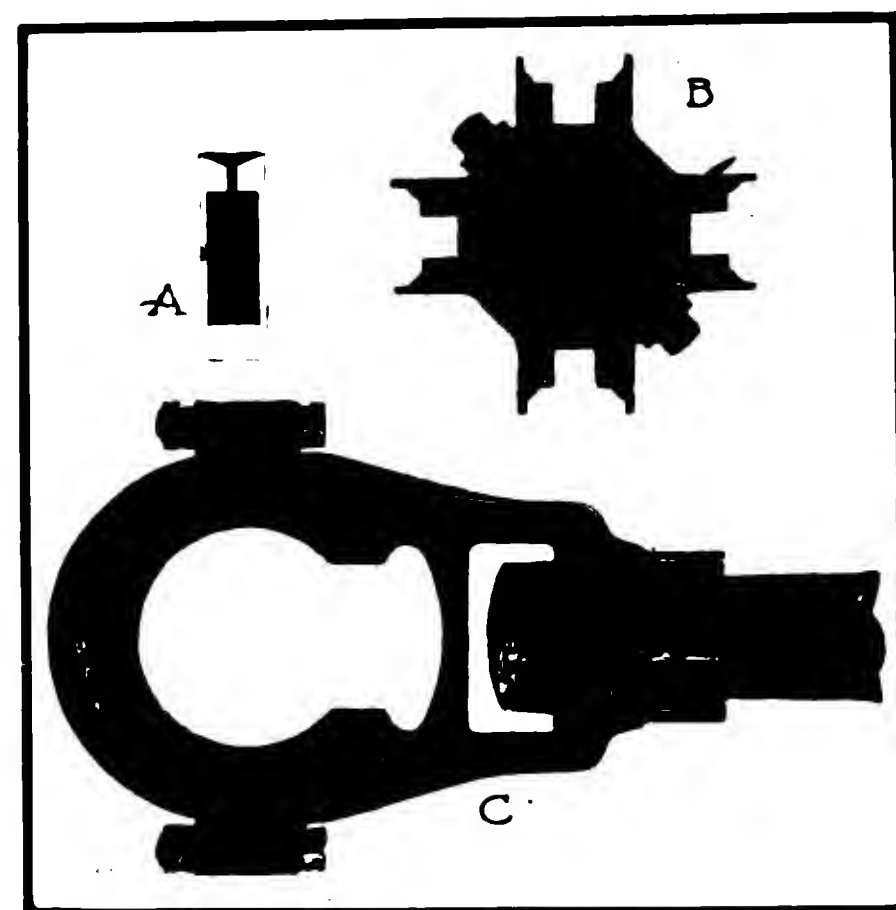
Prominent engineers the country over have testified to its sound mechanical construction and design, and the layman, knowing little that is technical will realize that because of the basic principles

tendency of the average operator to neglect this important piece of mechanism, and will doubtless do away with much of the trouble which has been experienced by so many vehicle car owners, who sooner or later must realize that they alone are responsible for 90 per cent. of all the faults that develop in the average universal joint.

New Joint of Simple Construction.

The feature of the Ev-R-Greezd joint which so strongly appeals to the mechanical engineer, is the simple construction, the design of which gives great strength without much bulk. It has two moving units and a third, or center member which is non-moving. The two moving members consist of yokes, or forks fitted with removable caps fastened with two steel alloy stud bolts, castle type nuts and cotter pins.

The third member consists of a hollow phosphor bronze casting having ribs cast on the periphery, which form the grooves in which the steel yokes function. Flanges are formed above the grooves at each side, which act as guides for the yokes. Thin strips of leather line the inside of the flanges, preventing the es-



Universal Joint Disassembled: A, Section Through Lubrication Cartridge; B, Center Member of Joint Showing Plug Openings and Lubricant Container; C, Yoke End of Joint Showing Method of Fastening Cap End.

caper of the joint is revolved the greater this force acts. If the joint should become heated the lubricant is thinned, due to the heat, and flows more rapidly, thereby distributing more lubricant to the bearing surfaces. Thus automatically this joint is lubricated and the lubricant is only applied when absolutely needed, making it impossible to overheat.

The third member is filled with lubricant through either of the two filling plugs which are screwed into it in easily accessible positions opposed to each other and is large and handy to service.

To still further prevent the leaking of lubricant and entrance of dust, steel plates faced with leather are screwed to the non-moving member in such a manner that the plates overlap the yokes, thus making a positive joint that is air tight. The propeller shaft is attached to the yoke at the small end, an opening in the forging providing access to the nut on the threaded end of the shaft.

Special Features of the Construction.

No pins are used in the construction of the joint, which requires that they be located at right angles to one another. The action of the yokes is at a positive right angle, which is due to the adaptability of the design for machining, and the two moving members are machined per-



Ev-R-Greezd Universal Joint Assembled, Showing Accessibility of Parts and Ease of Supplying Lubricant Through Plug Openings.

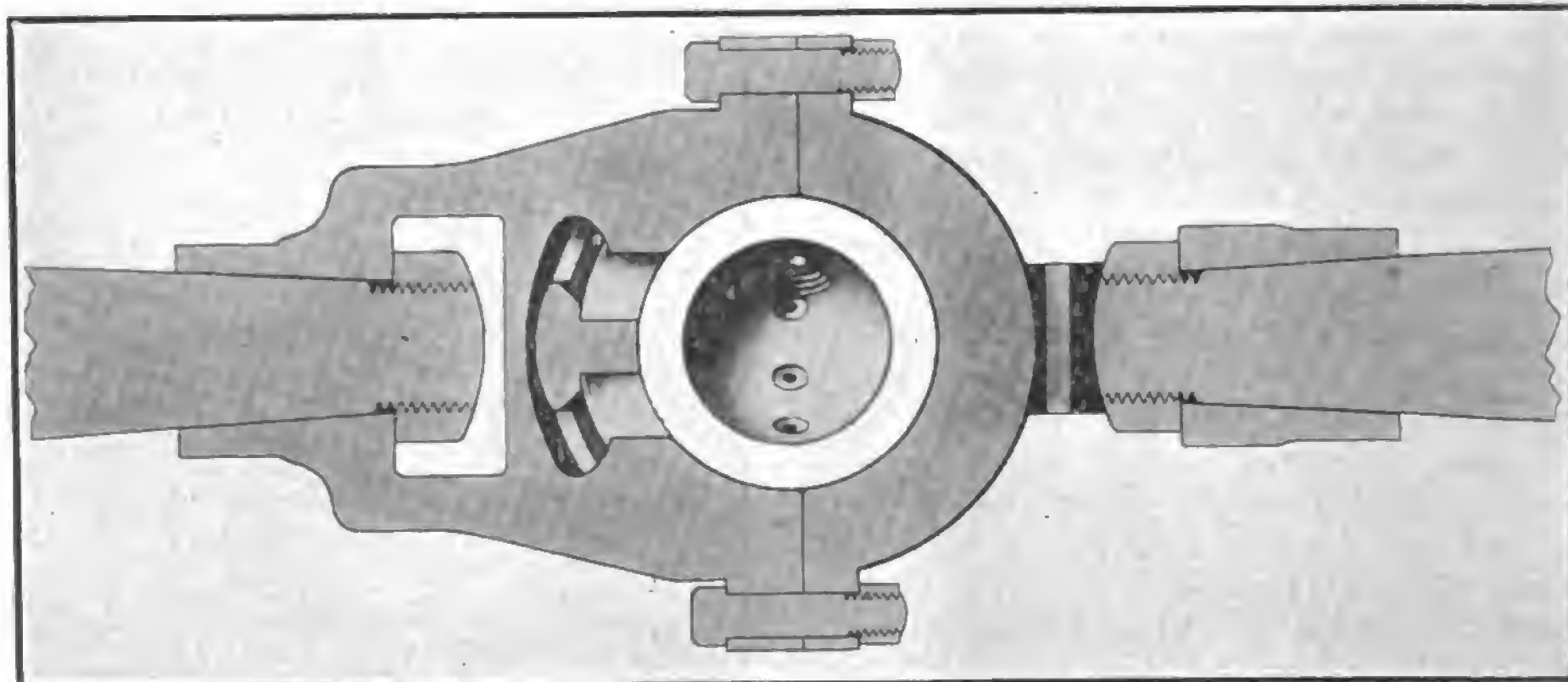
on which the joint is constructed it cannot but prove to be a satisfactory unit.

No one questions the efficiency of the average joint to stand up under any and all stresses. There are several unusually well constructed universal members on the market that will and do deliver maximum service if properly oiled and cleaned at regular intervals. If such joints develop faults, it is squarely the fault of the operator, and not the unit itself. Most drivers know that the average universal joint should be cleaned and oiled at least six times a year, but to their discredit it must be said that so long as the power is delivered to the rear wheels in fairly sufficient quantity, they pay but little attention to this part of the mechanism, which, as much as any other working part, is responsible for the satisfactory performance of the car or truck.

Regardless of how carefully the universal joint is designed and manufactured, the introduction of the human element gives it an uncertain quality to contend with, and it is easily understood why so many universal joints have to be replaced because of the carelessness of the driver. The Ev-R-Greezd Universal Joint was designed solely because of the

cape of lubricant, and thus making the unit lubricant tight and dust proof.

Lubrication is furnished by eight lubricant cartridges which are placed equidistant around the two main grooves of the non-moving member, the cartridges being filled with compressed felt, which supplies lubricant by capillary action from the well reservoir in the ball to the moving parts. Centrifugal motion also aids in distributing the lubricant, and the



Sectional View of Ev-R-Greezd Universal Joint Showing Location of Lubrication Cartridges and Method of Fastening Universal Joint to Propeller Shaft.

fectly central, also because of the adaptability of the non-moving member for perfect machining. The coefficient of friction must necessarily be very low, because of the positive lubrication and greater whip surface which is supplied, whip surface meaning the bearing surface which prevents the yoke from movement along the plane which passes through the centers of both furcations of the fork and the center of the hollow cast phosphor bronze ball of the joint.

Another strong feature of the joint is that it may be easily assembled in the passenger car in one complete unit without being taken apart; this being accomplished by means of its elastic construction. The angularity of the propeller shaft is much greater than joints of the usual design for the same bearing surface.

There are no boots, clamps, springs, bushings or small parts in the joint, and one can see by noting its construction that the longer it is used the tighter it becomes. All bearing surfaces are of bronze against steel, this combination being accepted by engineers as ideal.

All construction of the Ev-R-Greezd joint is covered by basic patents and others are pending. Production is ample to care for all present demands, although future policy has not been determined.

GOOD ROADS ESSAY CONTEST.

Various government agencies and national organizations have announced the new Goods Roads and Highway Transport national essay contest to be open to all pupils of high school grade. The national prize is a four-year scholarship in the university or college chosen by the successful contestant. It is offered by H. S. Firestone, Akron, O.

The contest will be conducted by the Highway and Highway Transport Education Committee, Dr. P. P. Claxton, United States commissioner of education, chairman.

Essays must be not more than 500 words in length, and must be written on the subject, "Good Roads and Highway Transport." All essays must be in the hands of local committees not later than June 15, when local and state committees will begin the task of grading the many thousands of essays expected.

Many local and state prizes are to be announced soon, but according to the committee, essays winning first honors in local and state contests will be eligible to compete for the four years university scholarship whether local and state prizes are offered or not.

Back of the idea of the essay contest is the wish of the Highway Transport committee and cooperating organizations to bring to the attention of the high school pupils of the country the urgent need for immediate improvement in the national highway system.

NEW GARFORD STATION.

The Garford Motor Truck Co. has secured the ground floor corner of the Plaza hotel building for offices and show rooms at St. Louis. The service station will be two blocks distant.

HICKS-PARRETT TRACTOR CO. GOES INTO TRUCK PRODUCTION

J. E. Tracy, for the past four years general sales manager of the Sterling Motor Truck Co., Milwaukee, Wis., became actively connected on April 1 with the Hicks-Parrett Tractor Co. of Chicago Heights in the capacity of vice president and director of sales.

The Hicks-Parrett Tractor Co. is headed by Vincent Bendix, who is well known in the automotive industry as the inventor of the Bendix drive for self-starters used on more than 95 per cent. of all American made and more than 60 per cent. of all foreign made automobiles.

The directors of the company include Mr. Bendix and the following: Geo. A. Gibson, vice president and general manager; John E. Tracy, vice president and director of sales; R. P. Hicks, consulting engineer; Herbert L. Scharlach, treasurer; Robert Barbour, president of the Barboux Flax Spinning Co.; Henry A. Rudkin of McClure, Jones & Reed, bankers, New York; B. A. Tompkins, vice president Bankers' Trust Co. of New York; Warren Barbour, president of the Linen Thread Co. of America, New York City.

The Hicks-Parrett Tractor Co. will continue the manufacture of Parrett tractors, of which more than 4000 are now successfully operating in this country, in addition to distribution already attained in 20 foreign countries.

The Hicks tractor now being placed on the market is a highly perfected "Crawler" type, for which many advantages are claimed. Its qualifications are of a specialized character for work on large farms and ranches—industrial work—road construction and logging.

The motor driven fire fighting apparatus which has heretofore been manufactured by the South Bend Motor Co. is now being manufactured and distributed by the Hicks-Parrett Tractor Co. This

angle of the business will be worked intensively. Plans are being developed for motor truck production on a large scale and the efforts of the company along this line will be on the heavy duty type.

The career of Vice President Tracy covering intensive salesmanship is interesting. For 10 years he was in charge of sales of the Milwaukee Corrugating Co., the largest manufacturers of sheet metal building products, with distribution throughout the entire country. He was then chosen by the Sterling Motor Truck Co. of Milwaukee to take entire charge of their United States, Canadian and foreign business, and during his four years activities with this firm placed their product, which is a heavy duty type truck, well up with the leaders.

Mr. Tracy was also the dominating factor in the formation of the National Association of Motor Truck Sales Managers, was its first president and then succeeded himself the second year. Foundation work of this organization has contributed very largely toward the betterment of truck sales practice and service, the results of which are bringing owners, dealers, distributors and manufacturers into a closer understanding of the problems of the industry. This organization work is nation wide and attracted the loyal and active cooperation of practically every well organized truck manufacturer.

During Mr. Tracy's presidency the association conducted a 3600-mile motor truck tour through the central and western states, starting from Grant Park in Chicago and finishing at the end of 60 days on schedule time in Milwaukee. This tour proved a remarkable demonstration to farmers, showing the possibilities of motor trucks on the farm, and developed a market which would not have been attainable so early in the history of the industry with the application of less intensive methods.

PIERCE-ARROW BUS ON 2000-MILE EASTERN TOUR.

To demonstrate the strides made in the development of the modern motor bus, a 2000-mile tour of eastern cities is being made by a bus recently introduced by the Pierce-Arrow Motor Car Co., Buffalo, N. Y. The bus, which seats 25 passengers and incorporates all the latest safety and comfort devices, is designed especially for the dual-valve two-ton chassis, which permits of a safe and economical speed of 23 miles an hour with a maximum of comfort for the passengers.

The route being followed by the bus includes the following cities: Rochester, Syracuse, Utica and Albany, N. Y.; Springfield, Worcester and Boston, Mass.; Providence, R. I.; Hartford and New Haven, Conn.; New York city, Newark and Trenton, N. J., and Philadelphia.

The Mack-International Motor Truck Corporation has opened a factory branch for Mack trucks in Charlotte, N. C. The branch will be managed by T. T. Perry, formerly with Ford of Detroit.



J. E. Tracy, Vice President and Sales Director, Hicks-Parrett Tractor Co., Chicago Heights, Ill.

NEW FACTO TRUCK DESIGNED FOR STURDINESS AND ACCESSIBILITY

THE Facto Motor Truck, a New England product, is manufactured in Springfield, Mass., and as demonstrated at the Boston show appeared to live up to the enthusiastic forecast made it. While it has no past by which its performance may be judged, its general design and substantial, rugged construction entitle it to be known as a quality 2½-ton hauler.

A. A. Geisel, long associated with the Federal Truck Co. as eastern sales manager, is sponsor for the new vehicle, and as president of the organization has had complete charge of every detail connected with the manufacture of the truck. The actual construction of which has been under the personal supervision of H. G. Farr, for many years associated with the Knox Motor Co as chief engineer, a position which he now holds with the Facto Motor Truck Co.

The aim of the Facto management has been to construct a strong, serviceable, accessible machine, which can be used with a trailer, and will sell at a reasonable price. This has apparently been accomplished, and from an engineering standpoint the Facto will no doubt prove to be a unit of sterling value.

Mr. Geisel is a believer in the assembled truck, and has some practical and novel ideas on the subject. As he expresses it, "The assembled truck is made by 20 specialists of single units, and simply must be better than the one vehicle manufactured by a single specialist of 20 units. Facto, a carefully assembled truck, has been thoroughly proven and tested under all conditions of service, and is given to the trade as the very best truck we can possibly manufacture," and the Facto truck appears to bear out his statements, although it is not the purpose, nor within the province

of the writer, to side either for or against the assembled car or truck.

Factory Ideally Located for Distributing.

While two units are at present operating, the plans accepted for the proposed factory call for a large structure containing 6500 square feet of floor space. The land for the factory has been graded, and connections to public utility water and gas mains have already been made, construction of the remaining units of the plant to be started as soon as conditions warrant.

The location of the establishment is ideal for distributing purposes, as it is situated between two lines of railroad, and is closely adjacent to the Connecticut river. Of brick construction this building will be practically fireproof, and will be well lighted by the use of unusually large steel sashed windows.

The large boiler house, already completed, will furnish power to all heavy tools by transforming and distributing electric current from the public utility company, and will also contain a case-hardening plant, and the motive power for the ventilating system with which the main plant will be equipped.

The main offices, which are also completed, will have space for the general organization, and offices for the several executives, the accounting and plant offices being located in the main factory building. The lower part of the main office building contains space which will be used as a show room, and in connection with this phase of the matter elaborate plans have been made.

In the important factor of service, Facto intends to make a name for itself by keeping in touch with the customer from time to time. The plans as outlined are such as to insure a friendly understanding between factory and own-

er, and the management looks for continued patronage of those who once purchase a Facto truck, if factory service of an intelligent, comprehensive nature can bring this to pass.

Specifications of Facto Truck.

The Facto 2½-ton truck follows conventional lines and is rather heavier than the usual truck of this class. It is powered by the Buda ETU engine. This power plant, which has gained well deserved popularity, is a four-cylinder, four-cycle, water cooled L-head engine, having cylinders ground to dimensions, which are, bore, 4¼ inches, and stroke, 5½ inches. It is rated at 28.9 horsepower by N. A. A. C. formula, and on dynamometer tests shows a brake horsepower of about 40 horsepower at 1300 revolutions per minute.

This type of engine is without doubt an especially desirable one for the commercial vehicle, and having been evolved through years of constant research and endeavor on the part of expert engineers, is especially well fitted for the work in hand, calling as it does for a rugged, elastic, easily accessible mechanism.

Lubrication is gained by pressure from a geared oil pump, driven from the center of the camshaft by a helical gear, the pump being immersed in the oil reservoir, being located at the lowest point of the crankcase. It is surrounded by a fine wire screen, which prevents the entrance of sediment into the oil tubes and bearings of the engine.

The oil is forced to the main journals and camshaft bearings by means of cast ducts, and through drilled ducts to the connecting rod bearings. Other working parts, such as cylinder walls, pistons and valve mechanism are lubricated by oil thrown off by the crank pins.

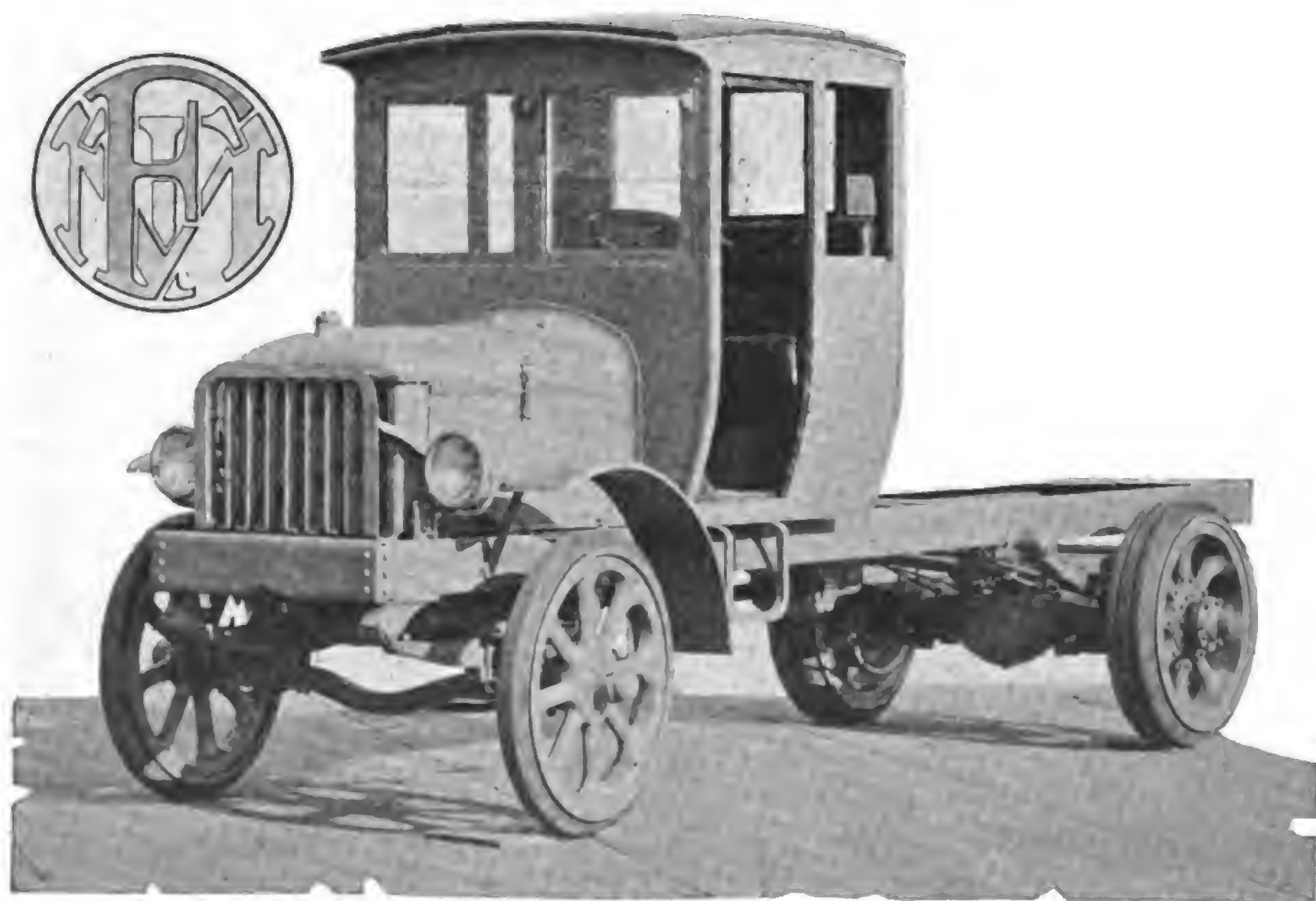
Ground Cylinders Insure Ample Power.

The manufacturers of the Buda ETU engine long ago adopted cylinder grinding as the only satisfactory way in which ample power at a minimum of expense could be gained. From a strictly utilitarian point of view, there is no other way in which this point of perfection can be reached, as boring and reaming, while long practised, did not give them a true, squarely aligned job, and the Facto, in choosing this type of engine, according to eminent engineers, has made a praiseworthy selection, admitting of course that there are many other makes of good engines available.

Cooling is accomplished by a centrifugal water pump, which is driven by the engine from the timing gearset. The current for timing and ignition being furnished by the high-tension Splittorf water proof magneto, which, fitted with impulse starter, is operated by an extension of the pump shaft.

Radiator May Be Adjusted for Extra Duty.

Among other unusual features of the Facto truck is the manner in which the radiator, a Bush vertical tube type, may

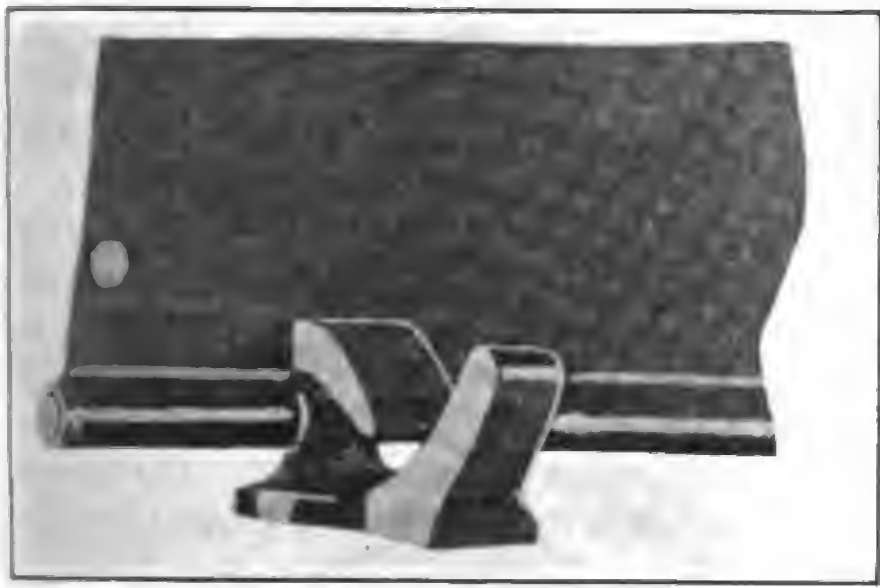


Three-Quarter View of Truck Showing Weather Proof Cab Headlights and Radiator Guard, All of Which Is Standard Equipment.

be adjusted to extra duty, such as hauling a trailer, or working in country where much low speed running is necessary. This is accomplished by means of an extra sized shell into which either a four-section or a five-section core may be fitted, standard equipment calling for the smaller size.

To enhance the accessibility of the engine, the radiator is attached to the frame of the chassis by two bolts on either side, which may be taken out in a few moments, after which, the water connection broken, the radiator is lifted from the frame. The hood cover also comes off by a time saving attachment, which not only makes removal a simple matter, but absolutely prevents rattling as well.

The water jackets are of ample size to keep the engine at an even temper-



Patented Hood Fastener Is Simple and Efficient.

ature, and there should be no overheating at any time even with rather strenuous usage as the pump is extra heavy and the cooling surfaces large.

Has Zenith Non-Adjustable Carburetor.

Carburetion is supplied by a Zenith non-adjustable carburetor attached to the engine intake manifold, and perfect ventilation of the gases is accomplished by means of the special cast intake and exhaust manifold, which allows the incoming gas to be heated by the exhaust gases before entering the combustion chambers, thus utilizing all available heat units and preventing the unburned units from contaminating and thinning the engine oil.

A Pierce governor is fitted to the engine, which governs the speed of the truck with solid tires to 18 miles an hour, and with giant pneumatics to 25 miles.

The clutch, enclosed in a housing in unit with the engine, is a Fuller dry plate, multiple disc type. It fits the inner face of the flywheel, and is operated by a foot pedal at the driver's left. The transmission, also of Fuller make, is located amidships, and is a sliding gear with four speeds ahead and one reverse. The unusually low speed allows for ample reduction under all conditions and at the same time permits of a higher gear ratio in the rear axle.

The main and counter shafts operate on non-friction bearings, proving a very efficient gear set for hard consistent service. The drive from the transmission is through a propeller shaft, equipped at each end with Spicer universal joints, and the drive is arranged in a manner that eliminates angularity of the shaft under load, the power reaching the rear axle in a straight line drive when the machine is loaded.

The rear axle is a Timken David Brown worm drive, consisting of a worm mounted on top meshing with the worm gear, with differential enclosed in the hub of the worm gear. Splined axle shafts transmit the power from the worm and worm gear through the differential to the wheel hubs. All bearings are tapered rollers, and the axle is of the full floating type, the final reduction at the rear wheels being $7\frac{1}{4}$ to one.

The front axle is a Timken drop forged I beam, and the axle spindles are fitted with Timken tapered roller bearings.

Chassis Is Unusually Strong and Rugged.

The springs are made by the Spring Perch Co. They are heat treated, are of the banded type without center bolt and made from chrome manganese steel. They are especially strong because of the absence of the center bolt, in addition to which they are one-half inch oversize as compared by the engineers' report of proper specifications. The management of Facto decided that extra strength would be the best way in which long life for the product could be gained. The springs used are $2\frac{1}{2}$ inches wide by 41 inches long in front, and the rear springs are $3\frac{1}{2}$ inches wide by 56 in length.

These springs, which are of the semi-elliptic type, have been designed so as to be practically flat under load and their long length, extra width and flexibility are reflected in the exceedingly good riding qualities of the truck.

The rear springs used with the Hotchkiss drive take care of both driving and load stresses, and it is to allow for this that the Facto designers have used a spring one-half inch wider than is regularly called for. Heavy alloy steel clips attach these banded springs to the rear axle, the bands resting in deep pockets in the spring chairs forming a construction that will stand all kinds of abuse and which is used by only the highest grade of trucks.

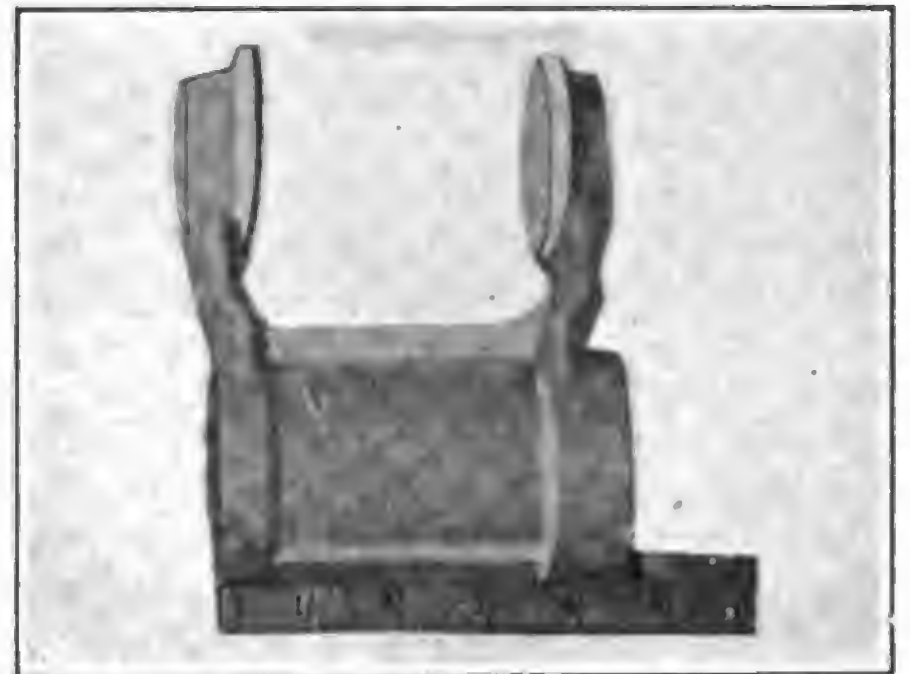
A feature that will appeal to the service men is the design of the rear spring system, allowing the entire rear assembly to be removed from the chassis by dropping the capped brackets of the rear spring cross rods and by removing the spring pins from their front brackets. This has been made possible by careful attention to spring shackle design.

To take the wear of the spring bolts in the spring ends, oilless bushings are furnished. These require no attention from the operator, and are easily replaced when worn out, thus giving what is practically a new perch at the spring ends.

Brake Rods Cannot Vibrate.

Among the several refinements which make the Facto desirable from the viewpoint of the buyer is the application of a novel principle to the brake rods to prevent excessive vibration and the slap that is often noted when the vehicle is running light. This excessive spring is not only annoying to the operator, but tends to wear the ends of the linkage and eventually loosen them.

The Facto idea, which is protected by

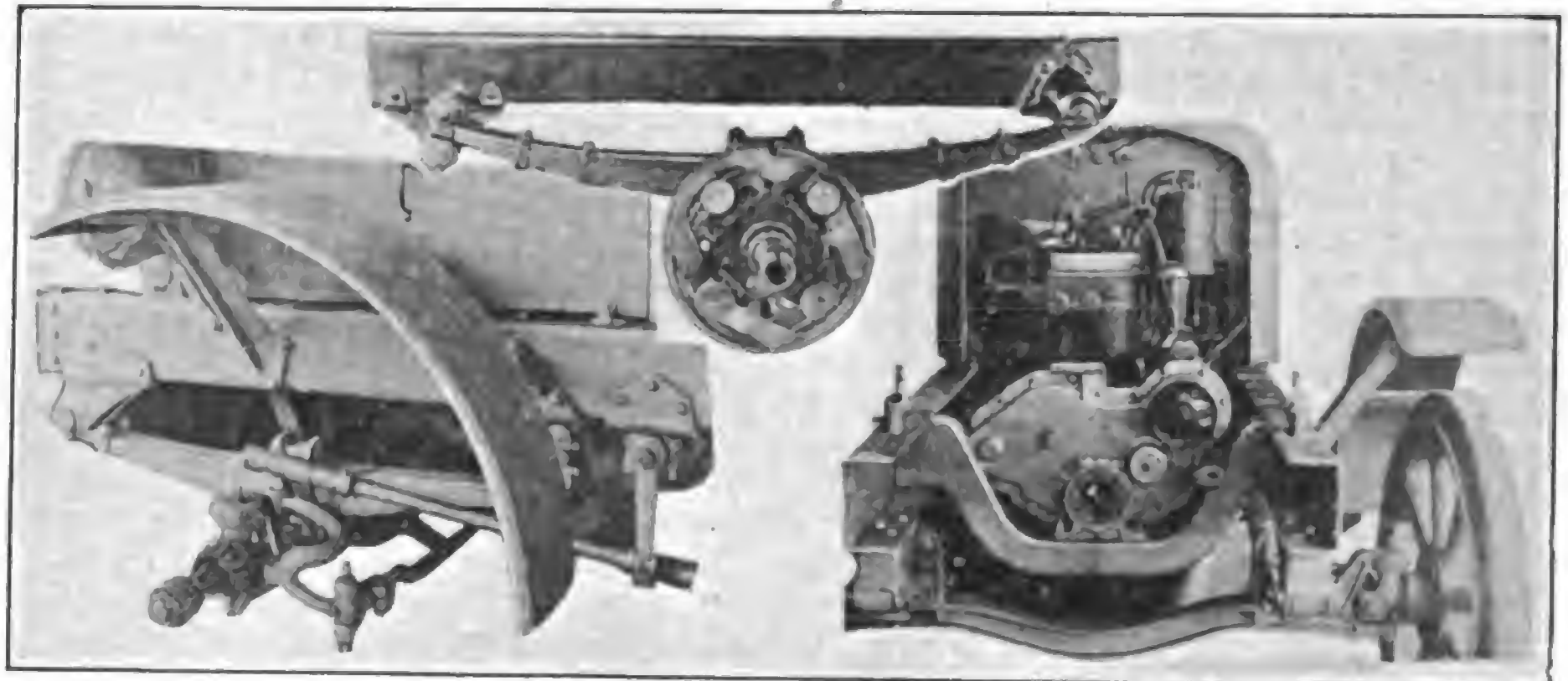


The Rear Spring Shackle Is Strong and Rugged.

patents, consists of a heavy wooden core attached to which is a heavy coil spring, which allows the rods to move only when the operator applies the brakes, the core being attached to the frame on either side at a point midway between the rear axle and the brake levers. This arrangement, though simple, is very effective, and should last indefinitely.

Another "Facto-feature" is the substitution of a large stirrup for the usual running board. This not only admits of turning the truck in a small space, as the wheels can be cramped against the frame, but also serves as an easy way for the operator to ascend to the cab.

Regardless of slippery or freezing weather, his foot cannot slip out of the stirrup like step, and one wonders why it has not been more generally used. The regular equipment of the Facto chassis includes a Detroit weather proof cab, which offers protection to the driver in



Upper—Showing Long, Flat Rear Spring and Method of Hotchkiss Drive. Left—Simple Sturdy Steering Gear. Right—Trunnion Support and Bracket of Three-Point Suspension. Accessibility of Engine Is Greatly Enhanced by Easily Removed Radiator.

winter as well as in summer. Equipped with heavy full back cushions and seat pad, with easily handled foot and hand levers, and with the steering wheel at the correct angle for comfort, the drivers' needs have been well taken care of, and it is evident that the manufacturer had his comfort in mind when designing the machine.

The truck frame of pressed carbon steel, is one-quarter inch thick and has sections $6\frac{1}{2}$ by $3\frac{1}{2}$ inches. This, like the springs, has been made heavier than engineer's specifications call for, and gives a strong, rugged chassis, which stand up and perform under undue stresses and strains.

The steering gear is a Ross Irreversible, and is located at the left hand of the driver. This steering gear can be disconnected and lifted out of the chassis while the cab is in place, thus making for accessibility of the engine. All control levers, of extra length, are located at the right hand of the driver.

Smith steel wheels are used, and the standard equipment size for solid tires is 36 by 4 on front and 36 by 8 on the rear wheels. Firestone duals 36x4 are optional equipment for the rear wheels. Good-year giant cord tires are optional with the buyer, the front diameters being 36 by 6 and the rear 42 by 9.

The gasoline tank is of heavy gauge steel with welded joints and is mounted under the driver's seat. The tank is of 25 gallons capacity, which is larger than is usually fitted on this size truck. Feed to the Zenith carburetor is by gravity.

The standard wheelbase of Facto, the length of which has been determined after exhaustive test, is 155 inches, and the tread is 56 inches, measured in the regular manner. The machine is fitted with two dash oil lamps, Prest-O-Lite tank and two head lights, oil rear light, a mechanically operated hand horn, a heavy truck jack and a complete set of small tools.

The Facto truck has several distinctive features that must appeal to engineers and truck men. With the completion of the other units of the factory it is expected that within a few months production will be ample to handle all orders that may be obtained, but at present the output is somewhat limited.

Mr. Geisel, president of the company, as a veteran merchandiser of power transportation, bases his forecast of good business for the future on hard, practical facts and conditions. He looks forward to banner business during the coming year, and his confidence is founded on experience and knowledge. While President Geisel sees a substantial volume of truck sales for the trade in general, he has faith in an early and increasing demand for Facto trucks in particular, and has backed his judgment in a financial way, as all expense of the business to date has been borne by him.

With an admittedly good product, a splendid location in the heart of a fertile field for truck distribution, coupled to an unusually comprehensive knowledge of truck selling, the Facto Motor Truck Co is well fortified to become a recognized factor in the automotive field.



"Being a writing feller like you are," said O. M. Vett, as he bit a couple of inches from the cigar I had given him and replaced the rest in his pocket—"Being as you're a so-called writer, I want you to figure something for me.

Then before I could reply to his seemingly ambiguous remark, "put down 365 and multiply it by three," he commanded, peering meanwhile over his spectacles at a piece of dog-eared paper on which a few figures were scribbled.

"Got that?" he asked. I nodded. "Now divide your answer by 90. What's the result?"

"Somewhere around 13," I said, after a moment's unfamiliar struggle with the figures. "Now that I've been a human adding machine, what's the idea?" I asked trying to sound sarcastic.

"The figure you have is the difference between horsepower and truck power," laughed the old man enjoying my puzzled look.

"I don't get you this time," I confessed.

"Didn't think you would," said Vett as he launched a successful shot of dark colored saliva and varnished a convenient dandelion. "But walk down to the village drug store with me and get a soda and I'll tell you on the way down.

"A horse on a farm averages about 90 days of work a year, doesn't he?"

I nodded, though I didn't know.

"That horse eats 1095 meals a year."

Again I nodded assent.

"That means then that he does a day's work at the expense to the owner of about 16 meals of hay and grain. It also entails the expense of a varying amount of shoes, harnesses and wagons which amounts to enough to call the average horse a mighty expensive investment to the farmer. The same thing is relatively true in all lines of business. Am I right?"

"You certainly are," I admitted. "I never thought of it in that way though," I confessed.

"Course you didn't. Average feller doesn't," said Vett. "That's the trouble with a good many of the so-called salesmen—in our office at least. They don't think at all."

By this time we had arrived at the drug store. "Come in and have some of this 99 $\frac{3}{4}$ per cent. water that they call soda," invited Vett. "I drink a little of it now and then when I've been working in my garden. Takes a man's thirst away good enough?" he said as we lined up at the soda fountain and he absent-mindedly felt for the brass rail with his outsize foot.

"But what I was saying is this. The average salesman forgets the main issue. He just tries to sell his truck. That's where he's wrong. What he should do is to sell education. The truck will then sell itself."

Back to Normal.—How Los Angeles Dealer "Cashed-in" on "The Slump Season".

There are indications a plenty that the truck business is hitting a merry pace on the road back to normal. Dealers and distributors who lacked courage early in the readjustment period to "step out" and create business or fight for their share of that which actually was there are having an opportunity now to look back and regret their folly.

Their little wait for "business to come back" has cost them a good deal in dollars and cents. They may feel a bit gloomy when they look about and see the prosperous condition of more valorous competitors who buckled up to meet conditions and kept good business going right through the slump.

In the long run, though, the lesson, however costly in the teaching, has been generally profitable. It has put new fight in distributing and sales organizations everywhere. They know now how to put on steam when trade moves slowly. They are convinced that there is more business to be had, even in normal times, than they had supposed. And they are determined to go out after it.

One of the most interesting illustrations of successful fighting spirit is the case down in Los Angeles of D. F. Poyer & Son, Transport truck distributors.

D. F. Poyer, senior member of the firm, and his son, L. P. Poyer, met the readjustment period with a carefully planned intensified selling programme. They threw every ounce of reserve force at their command into the fight and—won. The result of their effort is a beautiful new distributing plant, built during what other distributors termed "the slump season."

"We cashed in on every factor of our business," said D. F. Poyer in relating the growth of his company in the last few months. "We made every Transport owner a salesman through his 100 per cent. satisfaction with the consistent day after day service of his truck. We pepped up our dealer organization so there was not a dealer or salesman who failed to follow through to the finish on a prospect. Our service department to owners and drivers was perfect. Our advertising slogan, 'Poyer's Dependable Service,' was a by-word to hundreds of operators, who reaped the benefits from it and were reminded of it continually by advertisements in the leading newspapers of Los Angeles. Repeat orders augmented new business. Our new building tells the rest of the story. Volume of sales made necessary a finer, more modern place for the conduct of our business. We've done a big trade during the 'slump.' But we propose to keep up our intensified methods now that the market is becoming normal again."

MOTOR TRUCK DEMONSTRATES UTILITY AND ECONOMY IN UNUSUAL FIELDS

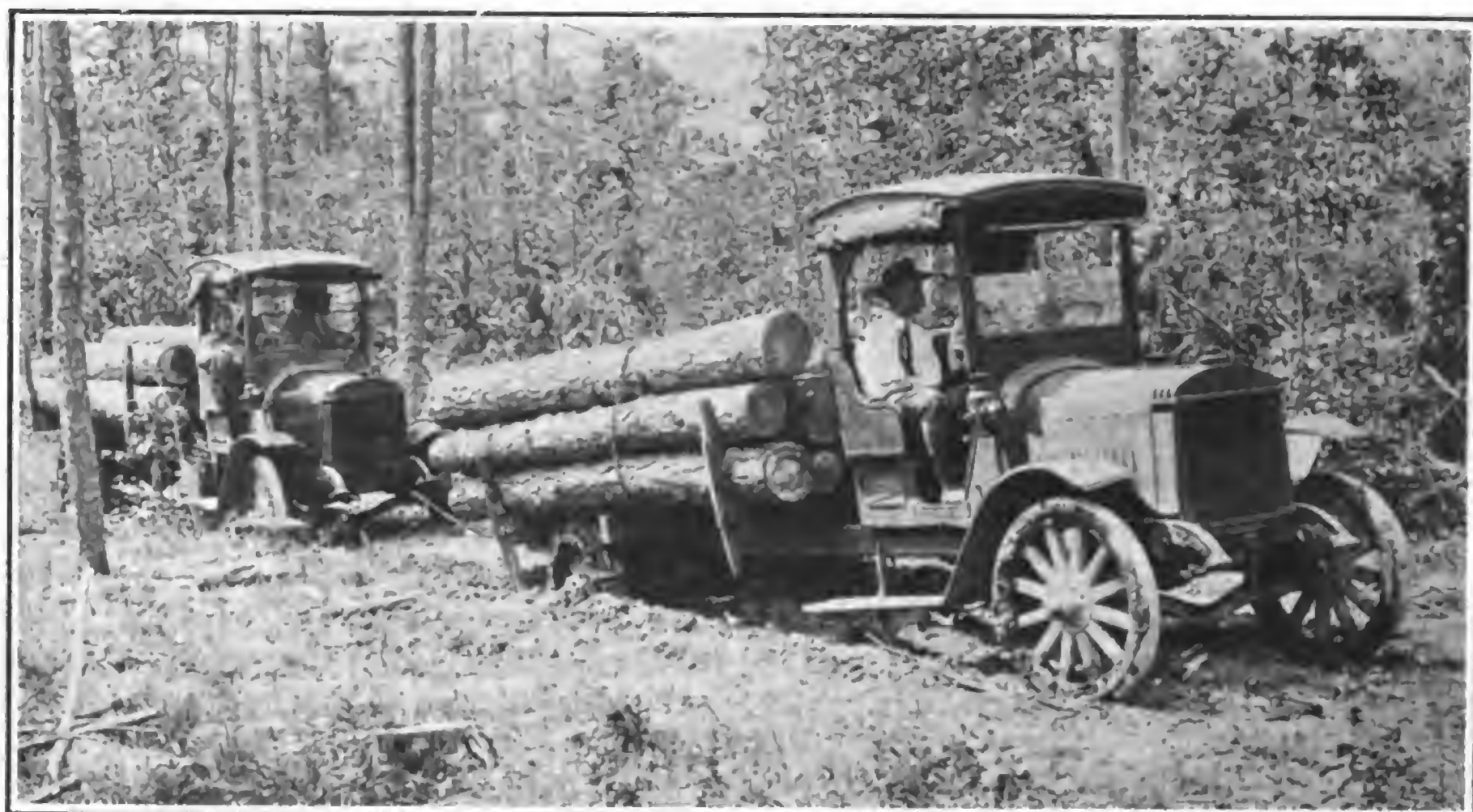
EACH new day finds the truck reaching out for more worlds to conquer. In scores of out-of-the-way, little known lines, trucks, especially equipped for the task, are doing jobs hitherto regarded as outside their domain. New uses for the truck are piling up to such an extent that it would seem that no task is beyond its sphere. Many of these vehicles are operating over terrain where the road builder has yet to find his way. They are working under conditions that test their ruggedness and draw on their last ounce of reserve power to accomplish the almost impossible.

Many truck manufacturers have their ears to the ground and are quick to follow up each new opening for truck utility. This is also true of body makers, who watch with interest the success of each new equipment. There are paths of endeavor yet to be unrolled before the power wagon which will mean business for the makers and good for the industry.

Many motor trucks operate in the logging regions of the northwest, hauling huge logs from the forests to the mill, and bringing the finished lumber from the factory to railroad terminals, where the lumber is loaded for shipment to the seaboard, from where it goes by water to Pacific coast ports or to distant parts of the world.

Many of these trucks operate over roads which are nearly impassable at certain times of the year and the fact that they are able to haul their specified loads without serious breakdowns and costly accidents and yet do their work economically, proves that motor trucks in this field are more than making good.

Public utility companies are heavy users of motor trucks and many instances are cited where trucks are equipped for some special work far from a base of supplies and perform in a manner which does credit to the manufacturer. The bright minds in the engineering



Motor Trucks Hauling Logs in Northwest Over Nearly Impassable Roads Through Virgin Forests.

departments of telephone companies have been instrumental in designing many special attachments for use with the power developed by the truck engine, materially lightening the work of the employees. Many of the tasks formerly performed by hand labor are now executed by the motor truck, which also transports the material to be used on the job and the necessary help.

Many Trucks Used in Railway Service.

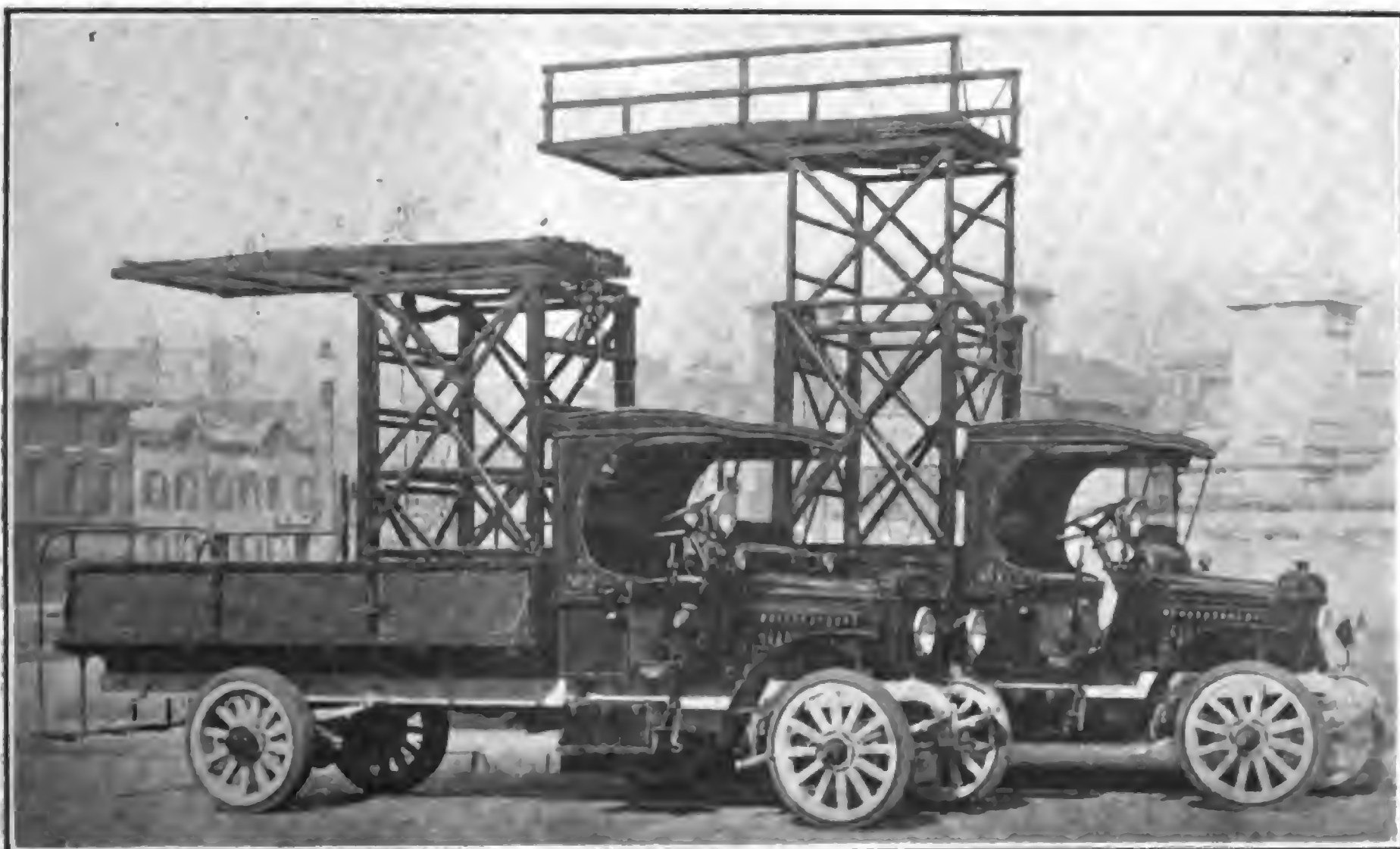
Electric railway companies are becoming more and more users of motor trucks designed especially for line work. Many of the trucks are equipped with elaborately constructed towers, fitted with special devices which raise and lower the working platform and swing it out of the way of passing trolleys. Trucks in this class of work operate over the city or suburban streets similar to any motor truck and are equipped with specially constructed bodies which carry the workmen and the material needed for the job.

Originally this work was cared for entirely by horse drawn vehicles. The horse drawn vehicle's lack of speed and the amount of time consumed in travel proved its undoing. The motor truck is able to negotiate the distance in much quicker time and to cover a greater amount of territory during a specified working day. Added to this feature is the comfort enjoyed by the workmen and the driver as most trucks fitted for this work are equipped with a cab, enclosed in winter, affording ample protection from the elements.

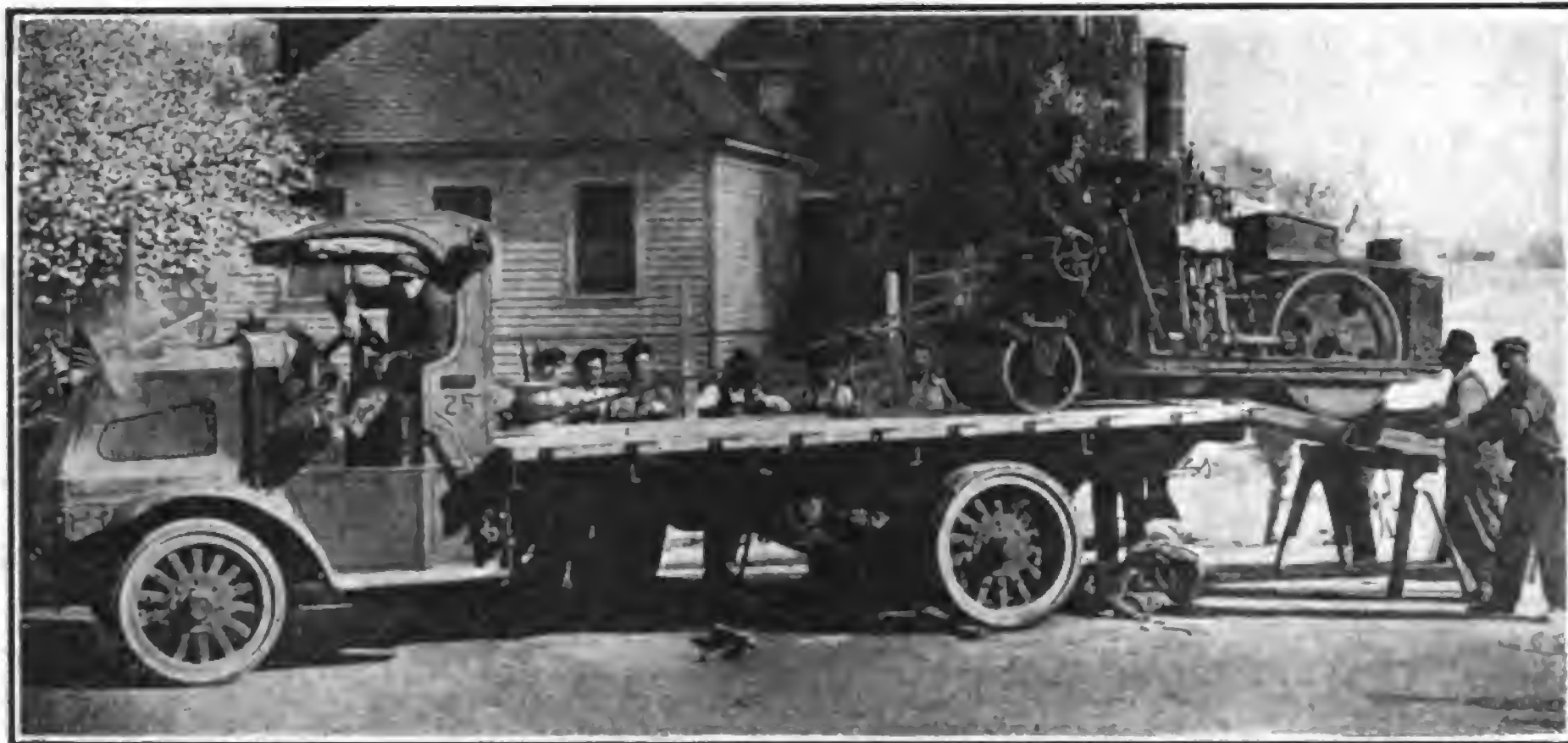
Special Trucks Required to Haul Hot Asphalt.

Road building contractors and the firms handling asphalt road resurfacing material and binders are heavy users of trucks. The latter companies often have long distances to cover and the load must be delivered to the job hot, necessitating the use of a small heating device in connection with the large tank in which the material is hauled. Spraying arms are fitted under the tank within a short distance of the ground through which the hot asphalt is sprayed onto the road surface by pressure. The pressure is supplied either by a pressure pump operated by the engine through the power take-off of the transmission or by means of a small steam engine, taking its steam from the boiler of the heater. The Texas and Standard Oil companies are heavy users of this type of truck, as is also the Barber Asphalt Co. The increasing use of the power vehicle in road building and resurfacing old roads attests to its value for this particular class of work.

Other trucks owned by these companies are equipped with a platform body and fitted with a winch hoist, which enables the driver and helpers to quickly load and unload such machinery as the small steam rollers used to roll down the top covering of an asphalt-covered road. The power winch is operated by the power of the engine, the power being taken from the power take-off of the



Street Railway Companies Find That Tower Equipped Motor Trucks Solve the Problem of Quick Repairs to Overhead Wiring System.



Mack Truck Equipped with Transmission Power Take-Off and Winch, Loading Steam Roller Used in Rolling Hot Asphalt.

transmission. The winch is positioned over the top of the transmission on the platform of the body or on a slightly raised platform in the rear of the driver's cab, which leaves the body platform clear for loading.

A power operated winch mounted on the truck platform body finds many uses and occupies but little space. Pulling other trucks or vehicles out of the mud, loading machinery, raising and lowering heavy material are all in a day's work for the truck so equipped.

The traveling machine shop is an innovation in truck service which originated in a western city, the owner traveling from town to town and to small villages. He picked up a lucrative business by doing the necessary machine work with the tools and machines mounted on the truck. Four men besides the driver accompanied the traveling shop and they were all kept busy.

A small gasoline engine connected direct to an electric generator furnished electrical power to operate the motors attached to the various machines, as well as supplying sufficient current for lights for night work. The forge was loaded onto the tail gate when ready to start and unloaded onto the ground when the next stop was made. The equipment on the truck consisted of a small engine lathe, drill press, emery grinder and work bench, besides miscellaneous small tools. Air pressure for certain operations was obtained from a large pressure tank carried at the side, while tanks containing oxygen for burning and welding operation were carried under the tail gate above the frame. The possibilities of such an outfit are unlimited for the mechanic who wishes to travel and work at the same time, but who does not care to settle down in a regular machine shop in a city or town.

Cleaning Catch Basins.

The city of Cambridge, Mass., has a Federal $3\frac{1}{2}$ -ton truck, especially equipped for cleaning catch basins, which saves the city \$1.01 a cubic yard on all work done in comparison with the cost of horse equipment. The saving is actually much greater than this as the figures were compiled without consideration of the distances traveled, the truck making a haul of $2\frac{1}{2}$ miles while the horse haul was but one mile.

It was due to the constantly increas-

ing cost of cleaning the catch basins of the city that motor equipment was decided upon. The city first purchased a $3\frac{1}{2}$ -ton Federal truck equipped with a special steel body of three cubic yards capacity and a Wood auto dump hoist for dumping the load by power obtained from the truck engine. This power hoist has been found of very great service in the saving of time and labor in dumping the heavy loads at the dump.

By this machine the entire operation of excavating the material from the catch basin, loading it into the truck, transporting it to the dump and dumping the load is done by mechanical power.

The excavating and loading of the material from the basins is done by means of an orange peel excavating bucket 18 inches in diameter and about 16 inches deep, holding about 1.50 cubic feet of material. This bucket is opened and shut by a piston and cylinder attached to the head of the bucket, and operated by compressed air at a pressure of about 100 pounds per square inch.

Compressed air is obtained by a Rand-Ingersol air compressor, type 12, located on a frame at the left side of the chassis frame. Power to drive the compressor is obtained from the main engine shaft

or propeller by a sprocket and chain drive to the shaft of the compressor. The compressed air is led to the bucket by two lines of $\frac{3}{8}$ -inch armored rubber hose. Underneath the platform on which the operator stands is a sliding valve or controller with which the two hose lines are connected, and by which the air is put into one hose line to open and into the other hose line to close the bucket, by pressing down or releasing the valve with the foot. The two hose lines are passed over pulleys on the crane and move back and forth with the hoisting chain as the bucket is raised and lowered. This hose feed device is a recent attachment and saves the services of one man formerly required to tend the hose.

The power to raise the bucket is obtained by another sprocket on the propeller shaft driving a chain to the right of the chassis, connecting by a simple arrangement of clutch and gears to the drum or reel operating the chain to which the bucket is attached. The bucket is lowered by its own weight controlled by a brake and drum on the countershaft applied by the operator's foot.

Both driving sprockets are controlled by one jaw clutch on the propeller, so that when this clutch is disengaged the engine is free to run the dump hoist or the motive transmission without running the excavating machinery.

Most of the special machinery was made at local machine shops from detail drawings made in the city engineering department. The total cost of the plant, exclusive of some changes made after the first use of the machine, has been about \$6000.

Among special uses for motor trucks is that of transporting the necessary power, including the generator, for thawing frozen water services. The winter of 1919 and 1920 placed water departments in many cities and towns in a difficult position as many services were frozen and it was next to impossible to attend to more than a few of them in a day. The



Federal $3\frac{1}{2}$ Ton Truck, Especially Equipped for Cleaning Catch Basins, a Money Saver for City of Cambridge, Mass.

method used was to build a fire over the service and thaw the ground so that workmen could dig down to the service and supply a new pipe section.

So many services were frozen that other methods had to be employed, with the result that the electric thawing outfit came into general use in many parts of the country, some of them privately owned and others owned and operated by municipal water departments.

In many instances a four-cylinder vertical, heavy duty gasoline engine supplied the power to operate the electric generator, which was connected direct to the engine crankshaft and operated at engine speed. Different methods were used to vary the line resistance for thawing, some outfits using wire resistance and others depending upon a barrel of water, varying the resistance by raising or lowering a weight connected to one end of the circuit lowered into the water, the opposite end of the circuit ending at a metal plate in the bottom of the barrel. Heavy wire cables, used to connect each end of the service pipes, were carried on reels on the side of the truck frame and were easily unwound when needed, a small motor attached to each reel winding the cable after the thawing operation was completed.

The beauty of this device is that it can travel anywhere a truck can go and is able to thaw services in outlying districts where power lines do not reach. For thawing services within a district served by power lines it is not necessary to equip the truck as stated above. All that will be required will be a transformer of sufficient capacity to transform the high frequency current to a lower voltage.

A barrel filled with water connected as stated above will offer sufficient resistance to thaw the service without damaging the pipes. A switch is located in an accessible position which connects the high frequency line wires with the transformer, connection to the line and to the service being made by temporary wires which are carried in sufficient lengths on the truck and are coiled when not in use. Care must be taken, however, not to overheat the service as damage may result to lead pipes.

The possibilities of such a device for winter work will fill in the gap for many owners of $3\frac{1}{2}$ or five-ton truck units



Motor Trucks Equipped with Hydraulic or Power Hoist Handle Coal, Gravel, Aggregate, Etc., at a Great Saving of Time and Labor.

where the wheelbase is of a length to allow the mounting of the electrical and power producing units.

Both steam and electrical railways are making use of trucks for track inspection, light service work and in many instances they are being used for passenger and freight service on lines which have proved non-supporting for the operation of steam trains. In this instance the steel rims, to which are fitted the rubber tires, are removed and steel rims fitted with flanges adjusted to the wheel rims. The steering linkage is locked as it is not needed for this class of work and the truck is able to work on steel rails as the tread of the truck is exactly the same as that of the railroad.

Power-Driven Auger Digs Pole Holes.

An earth boring machine or power driven auger has been recently invented by two officials of the Pacific Telephone and Telegraph Co., Motor Vehicle department, and well illustrates one of the many lines of work to which the motor vehicle is adaptable.

In the early days of constructing transcontinental telephone and telegraph lines there arose the necessity of an improved method of boring holes for poles. A machine designed for this purpose was purchased and mounted on the rear end of a horse-drawn wagon. This machine was powered by a four-cylinder gasoline engine and required a team of four horses to draw it through the territory in which the poles were to be set. This method

of locomotion was slow and difficulties were experienced when holes were to be spotted.

The limitations of this machine were apparent to the officials and they decided to combine their ideas and construct an earth boring machine which could be mounted on a motor truck and be operated by the power of the motor truck engine. The earth boring machine is mounted at the forward end of Four-Wheel-Drive truck, which was chosen because of the fact that the pole line invariably extends across country, and for this reason a four-wheel drive truck is absolutely essential to enable the truck to negotiate the surface encountered in plowed fields, irrigation ditches, etc.

The mounting of the boring machine is such that it is possible to bore a vertical hole with the truck on any negotiable grade. It is also possible to bore a hole at any angle up to 45 degrees from the vertical, with the truck on the level.

The earth boring machine is driven through a universal jointed shaft from the power take-off of the truck transmission, allowing the earth-boring machine to be driven at a wide range of speeds and adapting it to soils of different natures, such as adobe, clay, sand, hard-pan, etc.

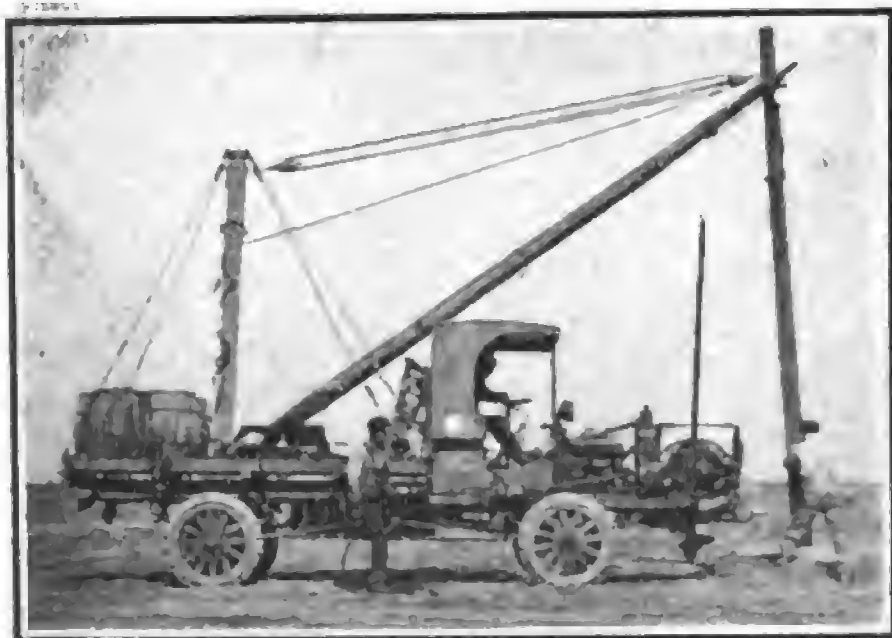
A derrick fitted with a movable boom is mounted on the truck bed amidship to facilitate the setting of the pole in the hole. The cross arms are attached to the pole while it is lying on the ground and are set with the pole, saving additional time and labor.

The controls of the earth-boring machine and derrick are located within easy reach of the truck driver, which obviates the necessity of changing his position to operate either earth-boring machine, derrick or to drive the truck.

The earth-boring machine is located at the left front corner of the truck frame, which allows the driver, steering the truck on the left to spot the point of the auger on the surveyor's stake with ease. The driver sets the brakes, shifts the compound gear of the truck to neutral and pulls in the clutch on the earth-boring machine. The auger is fed mechanically by gravity and as soon as the auger buries itself it is lifted by a second until the lower side is clear of the ground. Turning the auger clockwise at high speed frees it of the accumulation of dirt, throwing the dirt clear of the



Special Thawing Outfit, Including Four-Cylinder Engine Direct-Connected to Generator Supplying Current for Thawing City or Town Water Services, Capable of Working Outside of Power Line Limits.



Duplex Four-Wheel-Drive Truck Equipped with Post Hole Digger, Boom, Etc., Digs Hole and Sets Pole, Proving a Time and Labor Saving Unit.

hole. This operation is repeated until the hole is of sufficient depth for the pole. Statement is made that a hole six feet deep and 22 inches in diameter can be bored in an average of seven minutes, considering all classes of soil.

An improvement on augers heretofore used has been made by the officials of the company which consists of an earth retaining gate that prevents dirt lifted with the auger from falling back into the hole. The speed at which the auger may be driven depends upon the kind of soil encountered. For hard-pan the auger must be turned slowly to prevent the cutting edges from being burned. The cutting edges are replaceable, which fact lengthens the life of the auger. The cutting edges, two in number, are placed at an angle such as is found in a standard twist drill.

Another important feature which is incorporated in the auger gearing is that in case a hidden obstruction under the soil is encountered, the auger feed is automatically and immediately reversed, raising the auger and preventing any possibility of injury to the driving mechanism.

As a standard chassis and body are used it is easily possible to remove the earth-boring auger and derrick in a few hours time and to use the truck for other lines of hauling.

A feature which will appeal to others who may wish to construct a similar machine is that the cost of such an outfit is not prohibitive as much of the labor of



Federal Truck Owned by Metropolitan Ice Co., Boston, Mass., Equipped for Icing Refrigerator Cars.

construction may be done in the company shops in spare time and the interest on the investment will also prove large when consideration is given to the wide range of work for which this machine may be adapted. The weight of the earth-boring machine attachment is given as 1800 pounds, which is considered very light.

Many other uses for this type of machine might be suggested, including boring fence post holes, holes for planting trees, etc.

The Metropolitan Ice Co., 18 Commercial wharf, Boston, Mass., has a Federal truck equipped with the Monarch Eureka elevating body, of which Manager J. Clark Bennett says: "This equipment with three men more than replaces two pair of horses and six men." The company puts five tons of ice into two different cars with this equipment in less than 20 minutes. It does refrigerating car icing at all the Boston freight terminals.

The body lifts on four long screws within a steel super structure. The bottom of the body is 12½ feet above the street when fully elevated. It elevates in about one minute.

The power is furnished by the motor. The doors of this body are on the side and when open form a platform from the truck to the roof of the car. This allows the icing of the car with whole cakes, as the cakes do not have to be lifted.

The company finds this equipment very satisfactory for icing cars containing fruit or eggs where cake ice is used.

INTERNATIONAL HARVESTER DID RECORD BUSINESS IN 1920

The International Harvester Co. in 1920 did the largest business in its history. Sales aggregated \$225,000,000, compared with \$212,000,000 in 1919 and \$204,000,000 in 1918. Notwithstanding the difficulties of foreign trade, the volume of foreign sales, including Canada, also was the largest in the company's history, totaling \$60,000,000.

The report for the year ended Dec. 21, 1920, shows net profits, after all charges of \$16,655,353, equivalent after preferred dividends to 13.86 per cent. on \$90,000,000 common stock outstanding at the end of the year, compared with \$12,608,726, or 10.51 per cent. on \$80,000,000 common stock outstanding in 1919.

The 1920 surplus, after deducting \$10,000,000 transferred for stock dividends last September, was \$68,350,741, compared with \$71,645,388 at the close of 1919.

"Machine selling prices in 1920 showed an average increase of about 60 per cent. above pre-war prices, and repair parts showed an average increase of only 40 per cent.," the report says. "The average increase in prices of all commodities for 1920 was 143 per cent. over 1914. The company derived practically no increase in machine selling prices in 1920 over the preceding year, while manufacturing costs increased more than 10 per cent., due principally to higher material

markets and higher wages paid to labor. The average number of employees on the pay roll in 1920 was 48,280, with a total compensation of \$89,930,000, as against 40,480 employees in 1919, with a total pay roll of \$63,040,000."

Under the company's new extra compensation and stock ownership plan, adopted in and effective for 1920, whereby 60 per cent. of the profit in excess of seven per cent. on the invested capital goes to the employees, \$2,760,263 will be distributed about May 1 among about 24,000 eligible employees. This extra compensation amounts to 1¼ of the sales for the year.

The 1920 percentage of net profits to capital invested was 7.9 per cent., compared with 9.6 in 1919, before deducting war losses.

The report says the company's industrial council plan, adopted in March, 1919, was operative during 1920, and furnished strong justification of its theory and methods. There are now 22 works council and 175 employee representatives. There are 8200 employee stockholders.

In general comment on business conditions and future expectations the report says:

"Cash collections on 1920 business were 87 per cent. in the United States, 75 per cent. in Canada, and 70 per cent. in foreign trade, as against 1919 figures of 94 per cent. in the United States, 80 per cent. in Canada and 75 per cent. in foreign countries. The amount held in dealers' and farmers' notes at the end of 1920 was \$36,940,853, as against \$24,105,507 on Dec. 31, 1919. The effect of inventory adjustments was to cut \$7,500,000 from 1920 earnings, compared with \$5,400,000 in 1919.

"The close of 1920 found this company, like other American industries confronted with serious problems of readjustment. These problems involve a reduction in selling prices and an adjustment of costs to enable such selling prices to be reached. As the pay rolls constitute so large an element of cost, reductions in wages and salaries throughout the entire organization are essential."

TO PRODUCE VULCAN TRUCKS.

Frank Waterhouse & Co. has disposed of its automobiles at auction and will henceforth devote its energies to the manufacture and sale of Vulcan trucks in three different sizes. The company is now making and marketing a 2½-ton model and will soon start production of 1½ and 3½-ton models.

WHITE WORKING FORCE CUT.

The White Co., Cleveland, reduced its working force on May 1 from 5000 to 3000 employees. The company accumulated a reserve stock while running both night and day during much of the depression period.

27 P. O. TRUCKS IN PORTLAND.

The Postoffice Department plans to put 27 motor trucks on the job of collecting, delivering and transporting mail in Portland, Me., early this summer.

CLIMAX "TU" ENGINE FOR HEAVY DUTY TRUCKS AND TRACTORS

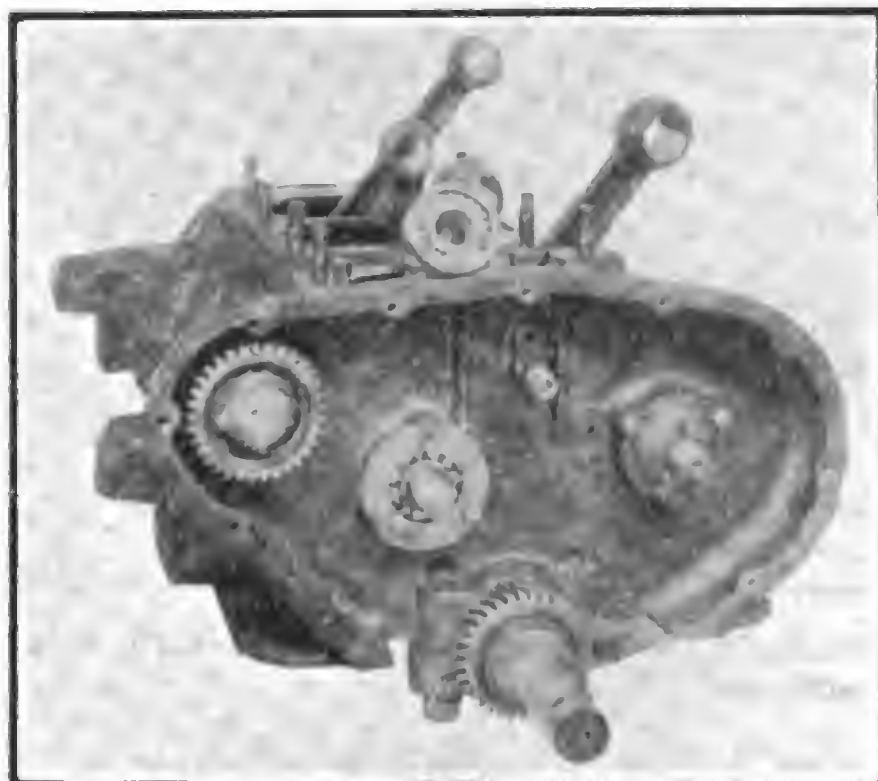
THE Climax model "TU" engine, 5½ by seven-inch bore and stroke, is the latest product of the Climax Engineering Co., Clinton, Ia. This engine has been developed to meet the demand for a larger and more powerful unit adapted to heavy duty trucks and to four-plow tractors where the most severe conditions must be met and the greatest amount of work accomplished with the least expense.

Many features of the new model follow exactly those of the smaller model "K" engine manufactured by this company. These features have all been thoroughly tested during the past three years and have reached the final stage of development so that their use in the model "TU" engine is in no way experimental.

To these various features have been added several others involving still further advanced practise.

Special Type Fan Drive.

The gear driven fan, while not new in conception, was worked out along improved lines so that previous faults in similar designs were eliminated. The final drive to the fan blades is through a friction, which prevents damage resulting from inertia effects of the fan with sudden starting and stopping of the engine. This friction drive is controlled by a spring action so that it needs no take-up adjustment. The fan spindle is mounted upon high grade radial ball bearings fully capable of caring for the thrust load of the fan as well as the radial load. The gears driving the fan originate in the regular train of gears for operation of the camshaft. The pinion of the fan spindle is of hardened steel and the main drive gear on the crankshaft is also of steel. The other gears of the train are semi-steel, 1¼ inch face and 10 pitch. The gears are all enclosed and thoroughly lubricated.



Timing Gearset Cover and Gears Removed Showing Radial Ball Bearings of Idler and Pump Shaft.

To secure the best results when using kerosene, which necessitates the maximum allowable temperature of the jacket water, a Sylphon thermostatic regulator is made an integral part of the engine. The thermostatic element is fitted into the water outlet manifold and the water by-passes directly back to the water pump until the temperature reaches a predetermined point, when the by-pass is closed and the usual circulation through the radiator takes place. This action is entirely automatic and enables the engine to change to kerosene, after starting with gasoline, much more promptly than would be the case without the regulator. The use of the regulator also aids in operating with kerosene in cold weather and largely does away with the necessity for covering part of the radiator surface.

Provision is made for a standard No. 1, S. A. E. generator flange for the attachment of a gear driven lighting generator if desired.

The mounting of the water pump is changed from the previous model as it is

bolted against the back of the timing gearset. The bearing at the forward end of the pump shaft is a high grade radial ball bearing.

Governor of Unique Design.

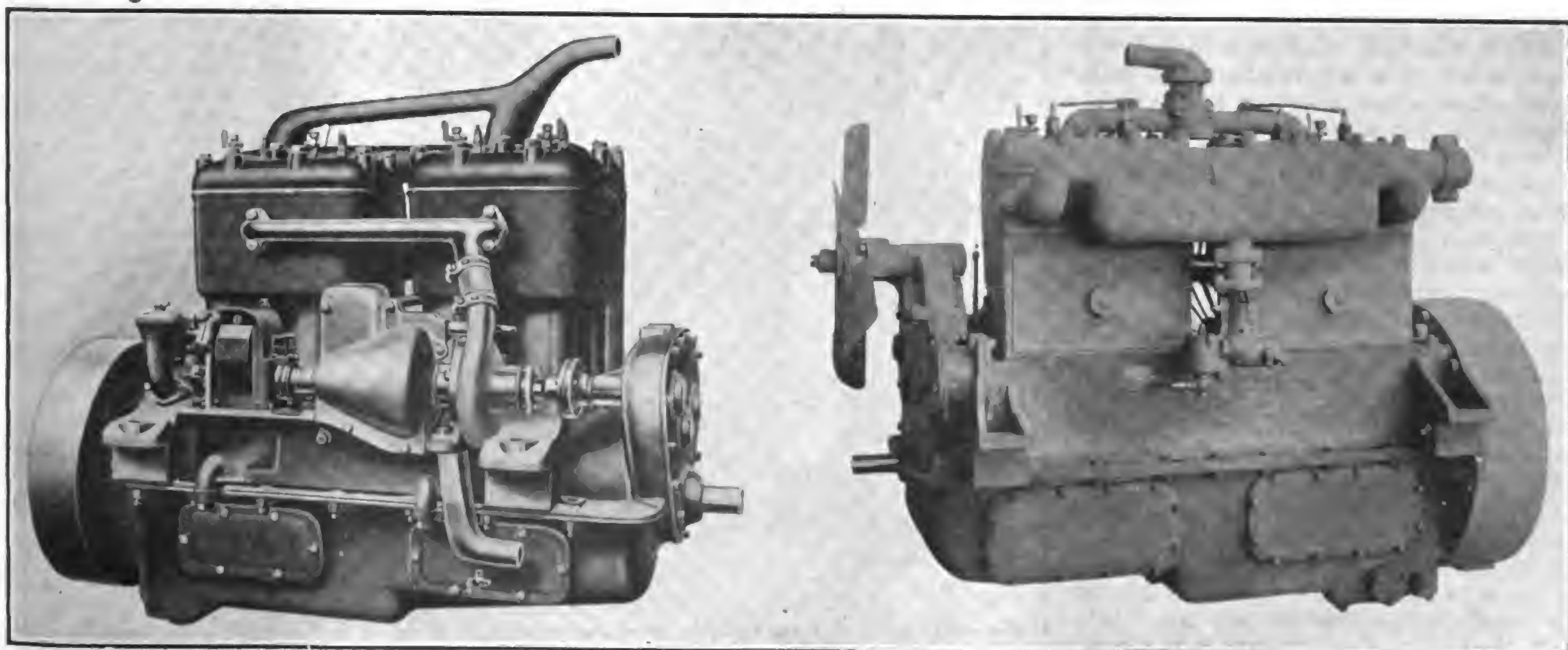
The governor in the model "TU" engine is built in as a part of the engine and the governor housing is connected by a large passage with the interior of the crank case and a breather fitted with a light valve is placed on top of the governor housing. This construction insures an oil mist surrounding all the governor parts, thoroughly lubricating them.

The oiler filler for supplying the oil to the reservoir is incorporated in the cover of the governor housing so that as fresh oil is poured in the principal parts of the governor are thoroughly bathed in oil. The bell housing over the flywheel in this engine is made a separate ring casting instead of being cast as a part of the crank case and oil pan. This feature facilitates assembling and makes it possible, if the customer desires, for the bell at the front end of the transmission to be continued over the flywheel, thus eliminating this ring entirely.

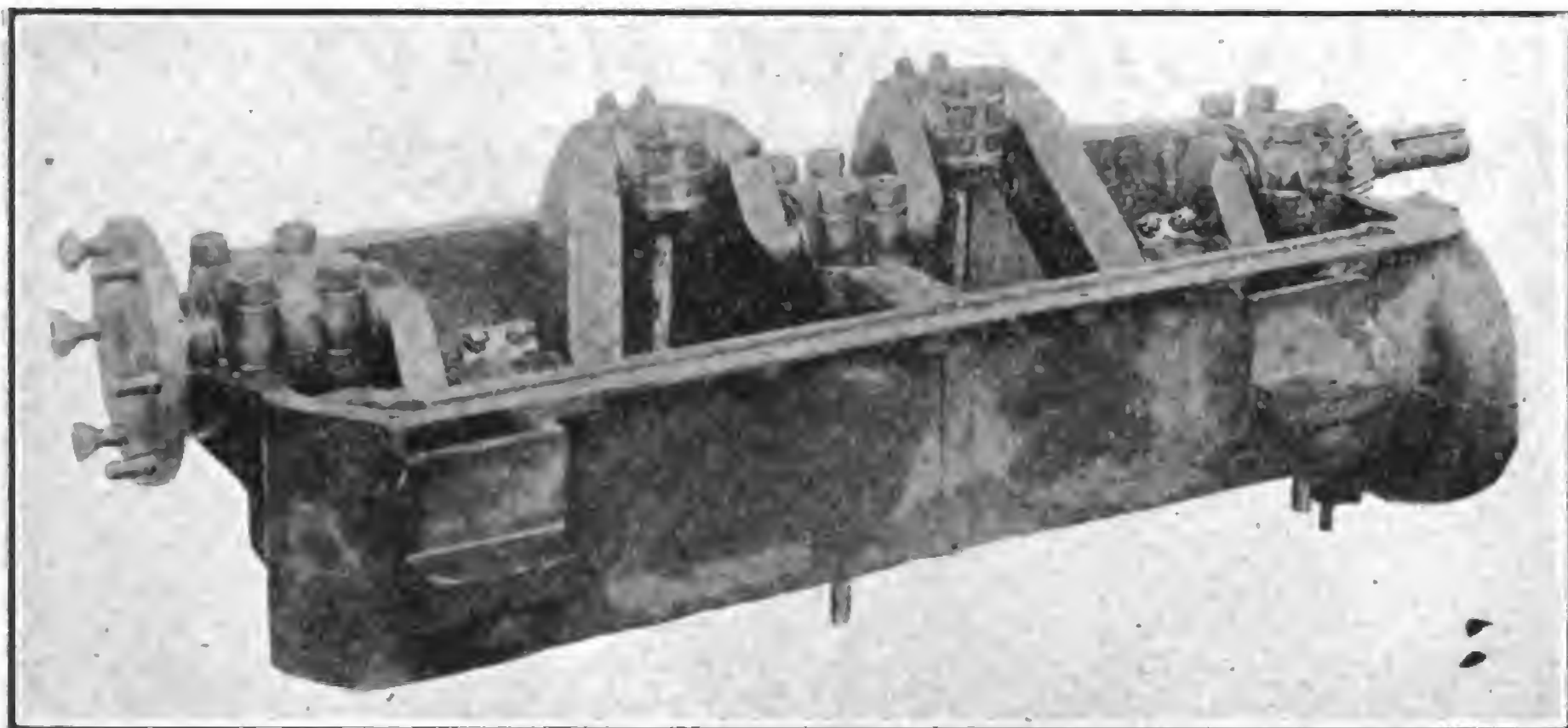
All other features of this engine are identical with those used in the smaller model. The oiling system is of the pressure circulating type without splash. The oil reservoir has a capacity of three gallons and is provided with baffles and check valves so that, even if the supply of oil is diminished, a sufficient amount is held at the rear end of the reservoir when going down grade to give a plentiful supply to the oil pump.

Oil Strainer, Perforated Brass Cylinder.

The oil strainer is of unusual construction, as it is made of perforated sheet brass instead of wire gauze. The strainer is cylindrical in shape and reinforced by a ¾ inch rod running its entire length



Left: Built-In Governor on Climax "TU" Engine, Lubricated by Oil Mist from Crankcase. Right: Carburetor Side of Climax Engine Showing Special Heating Manifold for Gas Mixture and Removable Plates in Lower Crankcase Housing, Which Allows Access to Main Journal and Crank Pin Bearings.



Lower Half of Crankcase Removed, Showing Rugged Construction Main Journals and Crank Pin Bearings.

through the center. The total area of the strainer surface is stated as being 40 square inches, which makes frequent cleaning unnecessary. When the strainer must be cleaned it may be instantly removed from the outside of the engine by removing three cap screws and removing the strainer as a complete unit.

The oil pump is of the vane type, having hardened steel vanes of special design expanded by phosphor bronze springs and operating in a renewable sleeve. The passage from the oil strainer to the oil pump is cored in the solid casting. The oil pump is driven by a vertical shaft through bronze miter gears at the rear end of the camshaft.

The pump shaft is in two sections divided at the center line of the crank case and the drive is through a tongue and groove milled into the soft metal. This enables the oil pan to be removed without disturbing the oil pump parts.

The oil pump is easily accessible and can instantly be removed or inspected by removing four cap screws and removing the cover over the pump.

A special feature of the new "TU" Climax engine is that instead of using copper tubes and fittings to conduct the oil from the pump to the various bearings, 5/16 inch holes are drilled in the solid metal of the crank case for the oil passages. The ends of these drilled ducts are plugged with pipe plugs fitted with screw driver slots, allowing a means of cleaning the ducts when necessary.

From the oil pump a drilled duct takes the oil to the top of the oil pan casting, where connection is made to a large groove cast in the lower flange of the crank case. This groove is open for thorough cleaning and is finally closed by the oil pan and gasket when the halves are fitted together. This groove forms the main oil lead to the drilled passages through the side wall of the crank case, extends to the top and then runs parallel with the base with leads extending downward to the three main bearings.

Passages are drilled from the main journals to the camshaft bearings, allowing the oil to flow freely under pressure to these bearings. Oil ducts drilled in the crankshaft allow the oil from the main journals to flow directly to the connecting rod bearings and crank pins.

A liberal excess of oil is supplied to all bearings and the excess thrown from the

crank pins lubricates the cylinder walls and the wrist pin bearings.

To control the pressure and volume of oil a regulating valve is fitted at the point farthest from the oil pump. This valve is located over the timing gearset and discharges oil directly into the gearset over the cam shaft gear. If the bearings are allowed to wear, and more than the usual supply of oil passes through them, the valve closes sufficiently to maintain the pressure in the system and also controls the volume of oil to the different bearings.

Oil Flow Easily Checked.

To verify the circulation of the oil when the engine is running an indicator is provided in the front of the engine. This indicator is in the form of a small ball which lifts when the oil is circulating and drops when the oiling system fails through lack of oil or any other cause. This type of indicator has the advantage of being plainly visible regardless of the amount of dust with which the engine may be covered. This is considered a much better indicator than if

a glass tube were used through which the oil was pumped, as an indication of the oil circulation would be hard to determine if the glass were dust covered.

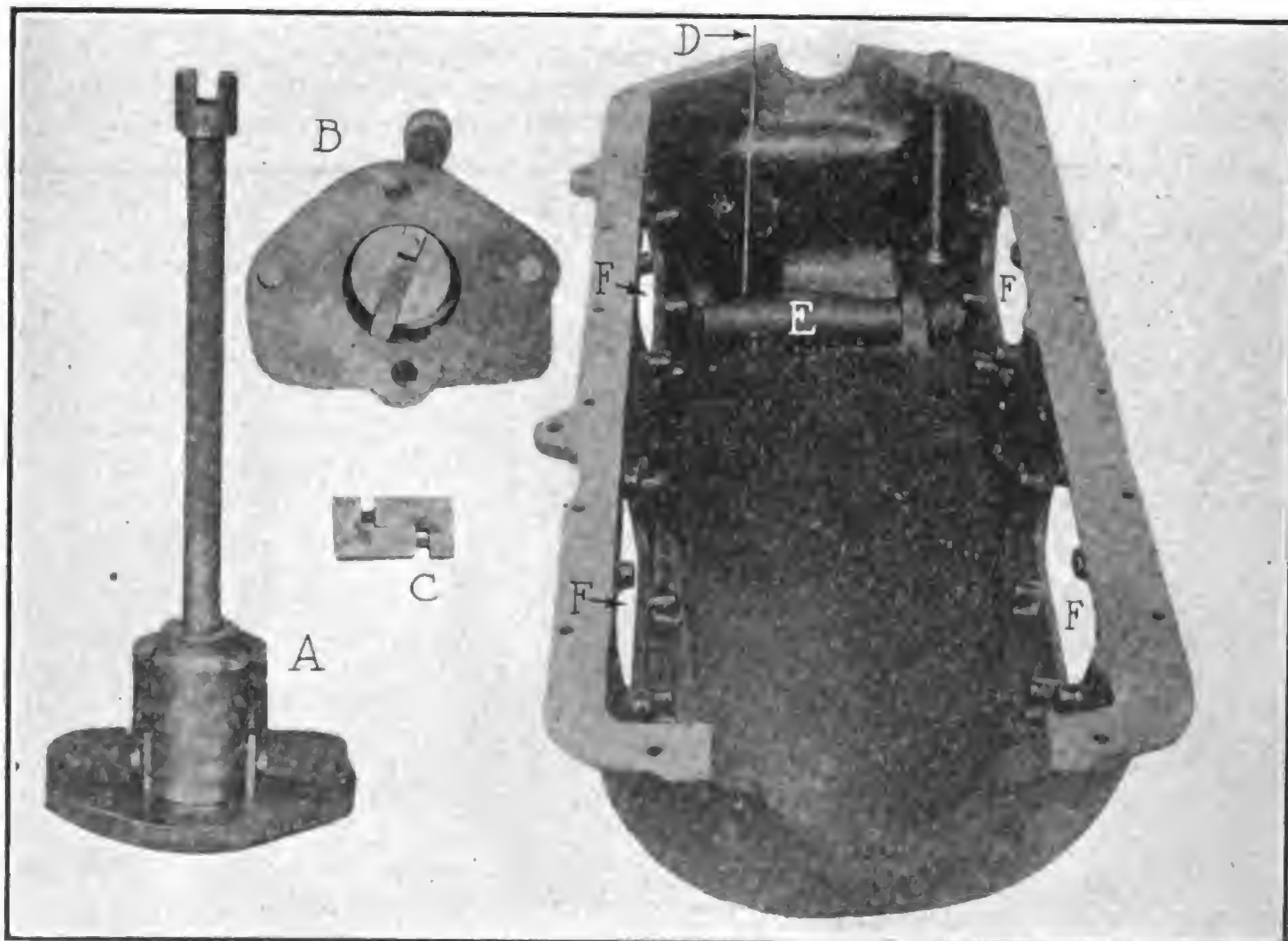
To indicate the amount of oil in the reservoir a second gauge at the rear of the engine is provided which consists of a small ball inside of a glass tube operated by a cork float in the oil reservoir.

The absence of all oiling devices besides the main oiling system is notable. The water pump bearings require no lubrication as the bearings and the glands are bored 1/32 inch larger than the shaft which operates in them. The shaft is rigid and is supported at the rear in a Bound Brook oilless bearing, which requires no lubrication. At the forward end the shaft operates in bearing lubricated from the timing gearset case. As the shaft does not touch the metal in the pump bearing and turns only on the packing, lubrication is not required. A Bound Brook oilless bearing is also used at the upper end of the oil pump shaft.

The installation of the idler gear is novel as the gear is keyed to a shaft which operates on a high grade radial ball bearing located under the gear and taking practically the entire load, the rear end of the shaft simply being steadied in a bronze bushing.

Ample Provision for the Exclusion of Dust.

Unusual provision is made for the exclusion of dust, which has been the death blow of many a good engine. Felt rings are used outside of the end main bearings. The covers over the valve mechanism are lined with felt strips. The oil filler is provided with a hinged, screw down cover, fitted with a felt packing ring in such a manner that when the cover is opened the oil filler tube is absolutely clean. The breather is provided with a large screen made of perforated sheet brass, which is easily removed for cleaning.



A—Oil Pump Drive Shaft. B—Oil Pump Drive Shaft Connection from Camshaft Gear. C—Oil Pump Vane of Hardened Steel Expanded by Phosphor Bronze Springs. D—Oil Reservoir Gauge. E—Oil Pump Strainer Made of Perforated Sheet Brass, Easily Removed for Cleaning.

Provision is made throughout the construction of the engine to exclude dust from all parts which are liable to be affected by the abrasive action.

Accessibility and Simplicity Keynotes of Design.

The L-head type of engine is claimed to involve fewer parts and at the same time allows for easy access to the combustion chambers, pistons, valves, etc. The four large hand hole plates in the oil pan allow unusual accessibility for inspecting the bearings and making adjustments. The side plates are very handy when cleaning the old oil and sediment from the oil reservoir and when fresh oil is to be added.

Climax engines have been designed throughout with a large factor of safety and statement is made that they will operate equally as well on kerosene for fuel as when gasoline is used.

Ample sized water jackets are provided around the engine cylinders, combustion chambers, valve pockets, spark plug bosses, and special provision is made for amply cooling the heads of the pistons.

The very latest ideas are incorporated in the manifold design resulting from a large amount of research work of the Climax engineering department, with the result that the "TU" shows wonderful economy in operation both as to fuel and oil consumption.

Instead of using the usual bolt construction in attaching the flywheel to the crankshaft flange, studs are used which are riveted over the back of the flange and the flywheel is fastened with deep conical nuts which are locked by special lock plates, cap screws and lock washers.

Climax engines are intended strictly for use in tractors, trucks and general heavy duty work. They are now built in two sizes as follows: Model "K" engine, open flywheel type, having a bore of five inches and stroke of $6\frac{1}{2}$ inches, rated at 35 belt horsepower at 850 revolutions per minute; Model "KU" engine, enclosed flywheel type, bore five inches and stroke $6\frac{1}{2}$ inches, rated at 35 belt horse power at 850 revolutions per minute; Model "T" engine, open flywheel type, bore $5\frac{1}{2}$ inches and stroke seven inches, rated at 44 belt horsepower at 800 revolutions per minute, and Model "TU" engine, enclosed flywheel type, bore $5\frac{1}{2}$ inches stroke seven inches, rated at 44 belt horsepower at 800 revolutions per minute.

The above ratings are given for operation with kerosene as fuel and may be considered conservative. When gasoline is used exclusively increased power may be figured upon.

In the past year many additions in machine tool equipment and a large grey iron foundry have been added to the Climax plant which, at the present time, is considered complete in every detail.

JAMISON IS KELLY-SPRINGFIELD FACTORY MANAGER.

The Kelly-Springfield Motor Truck Co., Springfield, O., has appointed W. J. Jamison factory manager, succeeding L. P. Kalb, resigned. Mr. Jamison was formerly superintendent of the Delco Light Co. plant at Dayton.



George D. Wilcox, Well Known in Industry, Made General Manager, Commerce Motor Car Co., Detroit.

WILCOX COMMERCE MANAGER.

The Commerce Motor Car Co., Detroit, has appointed George D. Wilcox general manager. He won his new post through efficient service as director of sales and advertising. O. D. Coppock, who has been assistant to Mr. Wilcox, has won promotion to the office of sales manager.

MASSACHUSETTS TO SPEND \$8,000,000 FOR ROAD BUILDING

The Massachusetts State Highway Department has available for this year's work close to \$8,000,000. About \$1,400,000 of this will come from the federal government, including a hang-over of some \$400,000 from last year's allowance out of the national treasury, which could



Orville D. Coppock, Promoted from Assistant to Sales Manager, Commerce Motor Car Co., Detroit.

not be used in 1920 because transportation conditions prevented getting materials delivered. The total also includes something like \$1,250,000 left over from last year's state appropriation, making around \$6,000,000 net to come out of this year's income.

There is nearly twice as much money available as ever before for Massachusetts highway work, but what must be done in 1921 and for each of several years to come, is an enormous job. Maintenance of existing roads will take \$1,000,000 apart from rebuilding or new construction, it is estimated. The biggest single job to be started at once is new construction on the Boston-Springfield road, where \$700,000 is to be spent on one stretch of 14 miles.

All state highways will be made wider and heavier, not only new ones, but old ones. The enormous increase in the number of vehicles of all kinds and types and the growing importance of motor truck transportation in this section of the country which the railroads can't serve adequately, make this almost an emergency measure.

Better drainage, heavier foundations, more care in the formation and structure of curves, and less shoulder are points in the new plans. The expense of this sort of construction is from \$50,000 to \$60,000 a mile, as compared with \$45,000 or \$50,000 for the old fashioned kind.

It is estimated that in the next 20 years, probably \$70,000,000 ought to be spent on reconstruction of bridges in Massachusetts. Bridges that were built to carry the load of hay and a pair of horses, moving slowly, are now required to carry anywhere from five to 20 tons, and the impact of that tonnage as it comes from the road on to the bridge is a very serious matter. There are reports of loads going through the bridges almost every week.

The maximum width of the highways up to this year has been 18 feet, but some of the roads this year are to be made 24 feet.

TRUCK OPERATORS ORGANIZE.

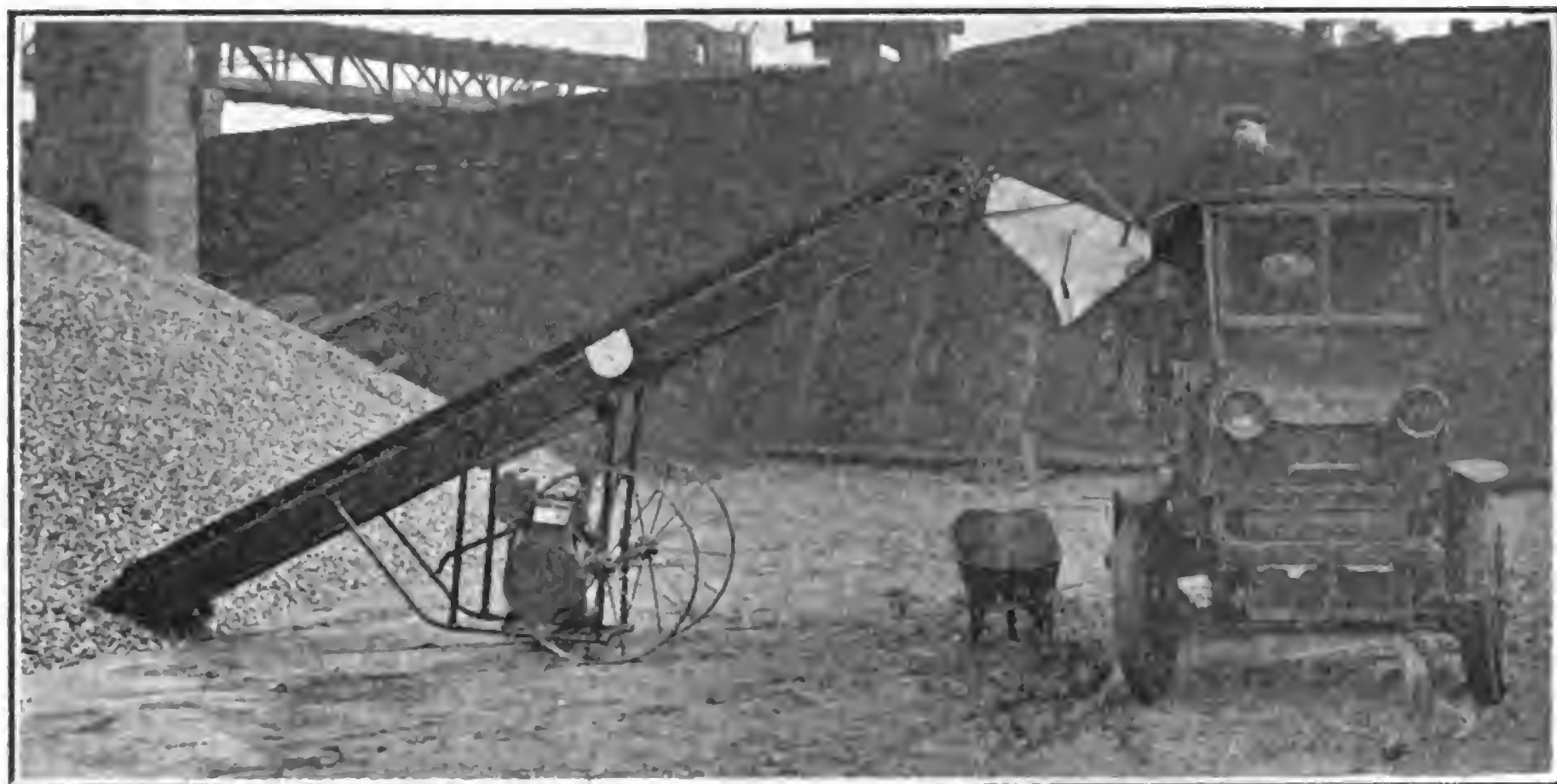
Michigan has 10,000 trucks on the road, in addition to 2500 busses, according to reports made at the April gathering of the Michigan Highway Transportation association, attended by 60 operators representing 15 counties. The association is a branch of the National Team & Motor Truck Owners' association and will work to stabilize the commercial hauling industry, to cooperate with state and local officers in regulating loads on highways and to stabilize rates and prevent illegal practices in the sale of trucks.

TO DISTRIBUTE TWO TRUCKS AND TRAILER.

Traffic and Union trucks and Miami trailers will hereafter be distributed in Central Ohio by the Columbus Truck and Trailer Co., Columbus, of which F. E. Hanna, formerly of the Oldsmobile company, is general manager.

The average wage in automobile industry in New York state is \$30.25 a week.

BELT CONVEYERS AND TRUCK LOADERS



Belt Conveyors Save Time and Labor in Handling Coal, Gravel, Crushed Stone, Sand and Other Loose Material in Truck Loading.

Road construction contractors and coal yard owners will be interested in the two types of material conveyors manufactured and sold by the Specialty Engineering Co., Allegheny and Trenton avenues, Philadelphia, Pa.

For many years this company has made a specialty of constructing and equipping coal pockets of various kinds throughout the East and Middle West and it is only of late years that they have commenced to specialize in portable conveying and loading machinery adapted to yard use for loading trucks.

Two types of loaders are shown, one a power driven belt conveyor, which may be adapted to many uses, such as conveying sand, gravel, crushed stone, ashes, coal, etc. The second type is in the form of a four-wheeled, bucket type conveyor fitted with a sieve at the upper end, which screens out the fine pieces as the material passes over it to the truck.

The conveyors are operated either by a gasoline engine contained in the base of the loader, enclosed in a sheet iron housing, or by an electric motor, which may be located in the same position, or as in the case with the belt conveyor on the side of the chute which carries the belt.

Conveyors and Loaders Have Many Uses.

A belt conveyor or loader will find many uses around a coal yard or in highway construction work, as it can be moved close to the material to be hauled, a screen attached to the upper end, the material shoveled onto the belt, the conveyor or loader carrying the material to whatever point it may be elevated and the falling material screened before reaching the new pile.

For removing bituminous coal the belt type of conveyor has been found extremely useful as the lower end of the conveyor may be set into the bottom of the pile, the coal shoveled onto the belt and elevated to the waiting truck or wagon.

The belt type of conveyor is mounted on two steel wheels of ample size and on account of its light weight may easily be moved from place to place in the yard. Unusually long conveyors are also made

which are used for conveying bituminous coal from the pile to boiler room and for conveying ashes from the room to an outside pile. The special belt conveyor consists of an endless rubber belt that travels on special "trugide" troughing idlers having three roller sections to each idler, which form the trough, and allows the belt greater capacity than if flat rolls were used.

At each end of the conveyor the belt runs on steel crown face pulleys, while the return belt is supported by return idlers of three roll sections.

Steel Struss Construction.

The troughing idlers and the end pulleys are mounted on a frame of steel struss construction which has the double advantage of making the frame strong and rigid and at the same time light enough to be easily moved. An adjusting screw is located at the discharge end of the conveyor that takes up the slack of the belt, while the feeding or driving section of the conveyor forms a protective casing for the motor, detachable panels at the front and on each side of the casing make the machinery accessible. A slot opening in the casing at the foot of the conveyor frame provides an outlet for dust from the material handled.

The driving section is fitted with a feeding trough made of steel plate which forms the hopper and prevents spilling and centers the material on the belt. The hoisting mechanism is located midway of the frame and consists of a frame of structural steel and an efficient chain hoist, which raises the conveyor to any desired height quickly and easily.

Truck loaders are made in either fixed or collapsible types, the collapsible type being used particularly where overhead clearance is low. The loader is designed for hard, continuous service and is constructed entirely of structural steel. The capacity of the loader is stated as one ton of sand or stone per minute. The chains are of heavy construction, steel bushed and run on cast iron sprockets, while the loader is powered by a 7½-horsepower electric motor or may be powered by gasoline engine if desired for work where electric power is not available.

A type of loader which is recommended especially for sand and gravel work is equipped with four horsepower gasoline engine, is fitted with gravel screen at the delivery end of loader for screening out coarse material and having all gears enclosed in metal guards to prevent abrasive action of the sand in the bearings.

STANDARD STEEL CHANGES.

During the past six months the Standard Steel Works, Kansas City, Mo., has installed a number of improved machines, giving greatly increased capacity, with a more economic productive cost. This benefit will be shared with customers by increased service and lower cost.

They have brought into the organization new men, whose experience and knowledge of the sheet metal industry will prove beneficial.

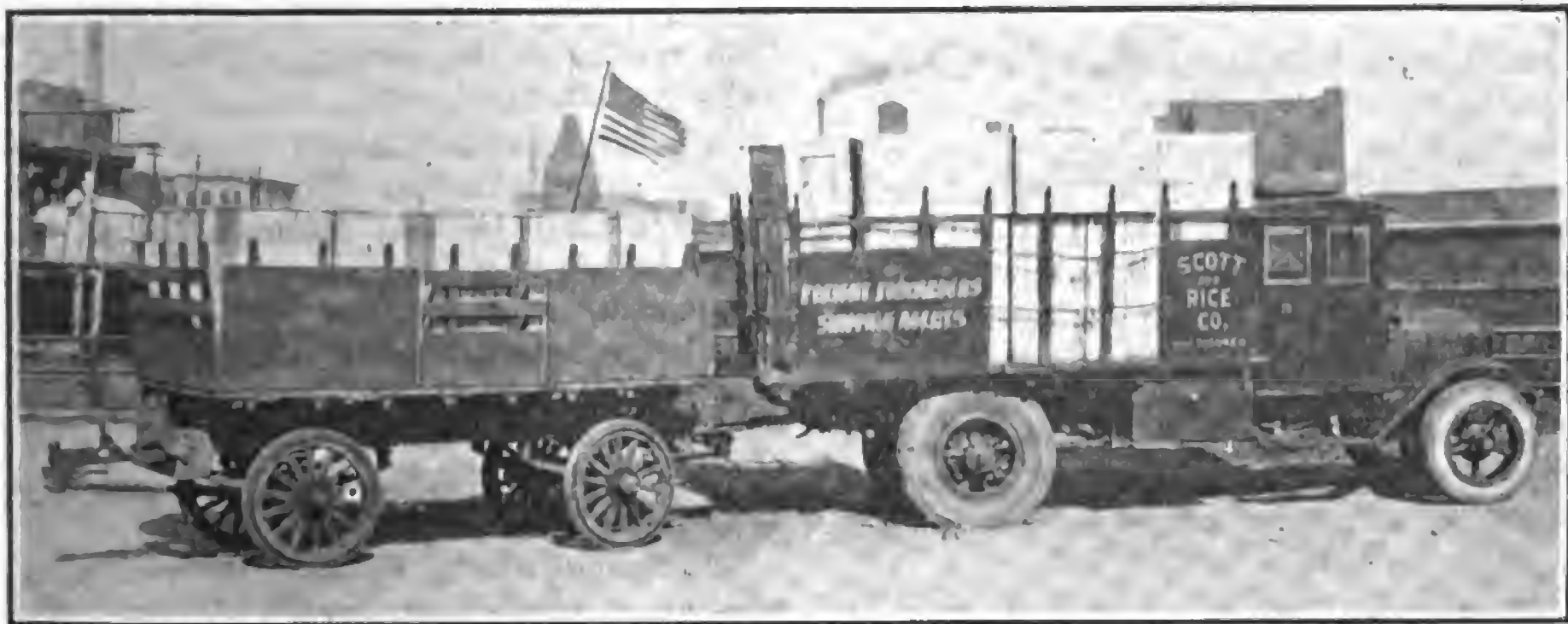
MORE RHODE ISLAND TRUCKS.

For the first quarter of the year the registration of motor trucks in Rhode Island was 1270, against 998 for the same period of 1920.



Loading Sand or Gravel Direct from the Bank at the Rate of One Ton a Minute with Lehigh Power Loader.

TWO-WAY SIDE DUMP BODY TRAILER FOR MUNICIPAL USE



One Or More Trailers May Be Attached to the Towing Truck by Means of the Simple Coupling Device, the Number Attached Depending Upon the Power of the Truck.

DURING the period of business depression the Warner Manufacturing Co., Beloit, Wis., perfected and is now in production with a new two-way side dump body which is constructed according to a combination of ideas obtained from city engineers throughout the United States.

The company felt that by getting ideas from widely scattered sources and from men in that line the engineers would be in a better position to design a dump body which would be adapted for general municipal work, such as ash, rubbish and garbage removal, etc. That the body is proving popular in the various municipalities where it is already in use is shown by the large number of testimonials received by the company. The body is mounted on a trailer that is adapted to be either drawn by horses or by motor truck or trailer and the company has recently been granted a patent covering the body and trailer combination.

The combination trailer and dump body has been tested under the most severe conditions that it was possible to find and so far the equipment has not shown a single weakness.

Steering Device Carefully Developed.

One objection offered against the use of four-wheel trailers has been that they have not, under all conditions, tracked properly with the towing truck.

This difficulty has been satisfactorily solved in the Warner trailer by the use of a long leverage of the steering arm, which is guaranteed to give complete control of the steering mechanism, thereby eliminating any possibility of deviation of the trailer from the path of the truck.

A further objection presented against old type four-wheel trailers was the condition that they were hard to operate in places difficult of access and hard to steer when backing.

By a radical departure from methods employed in the past, provision is made for attachment of the steering arrangement to the draw bar when the trailer moves forward and with the axle, in a locked central position, when backing up. This new method eliminates the possibility of knifing the draw bar when the

trailer gets into a cramped position when backing.

Under the new method devised by the company, when backing, the front wheels of the trailer are locked in a permanent position parallel to the frame or at right angles to the axle. Permitting the draw bar to swing to either side without possibility of damage as the draw bar is disconnected from the steering arrangement



Steering Is Accomplished by Means of a Tie Rod and Steering Arm Attached to Pivoted Steering Pole.

and receives nothing but the rearward push of the truck in moving the trailer backward. During the backward movement the guiding of the trailer is accomplished by an auxiliary steering bar applied at the rear end of the trailer.

In extreme cases when the problem exists of moving the trailer around a post, both sets of wheels can be so arranged at any angle to permit the movement of the trailer around the obstacle. The company claims that it has tested

this trailer and convinced intending purchasers that it is possible to operate the trailer in places too difficult for truck operation.

The method of attaching or detaching from the drawbar or axle is said to be very simple, as the Warner principle of universal ball and socket joint is used to make the connection.

The construction of the trailer does not otherwise differ materially from previous four-wheeled trailers manufactured by this company.

A point which has been kept in mind by the engineers is the possibility of adapting the new improvements to old style trailers already in use, and thus bring them up to date without great cost. The parts may be easily obtained and fitted to these old trailers of Warner manufacture at small cost, and when properly installed the old trailers are said to perform equally as well as the later models.

The Warner company feels that with the improvements which it has made in trailer construction that it has solved the difficulties found in the past with four-wheeled trailers, and is now offering the public a heavy four-wheeled trailer which eliminates all previous objections against such units.

Special Features of the Warner Trailer.

The outstanding features which cover, as far as the company was able to ascertain, all requirements of city engineers, are briefly stated as follows:

First—Low first cost.

Second—Interchangeability of the trailer equipment with other bodies for other uses.

Third—Simple construction in both trailer and body, guaranteeing low rate of depreciation and long life.

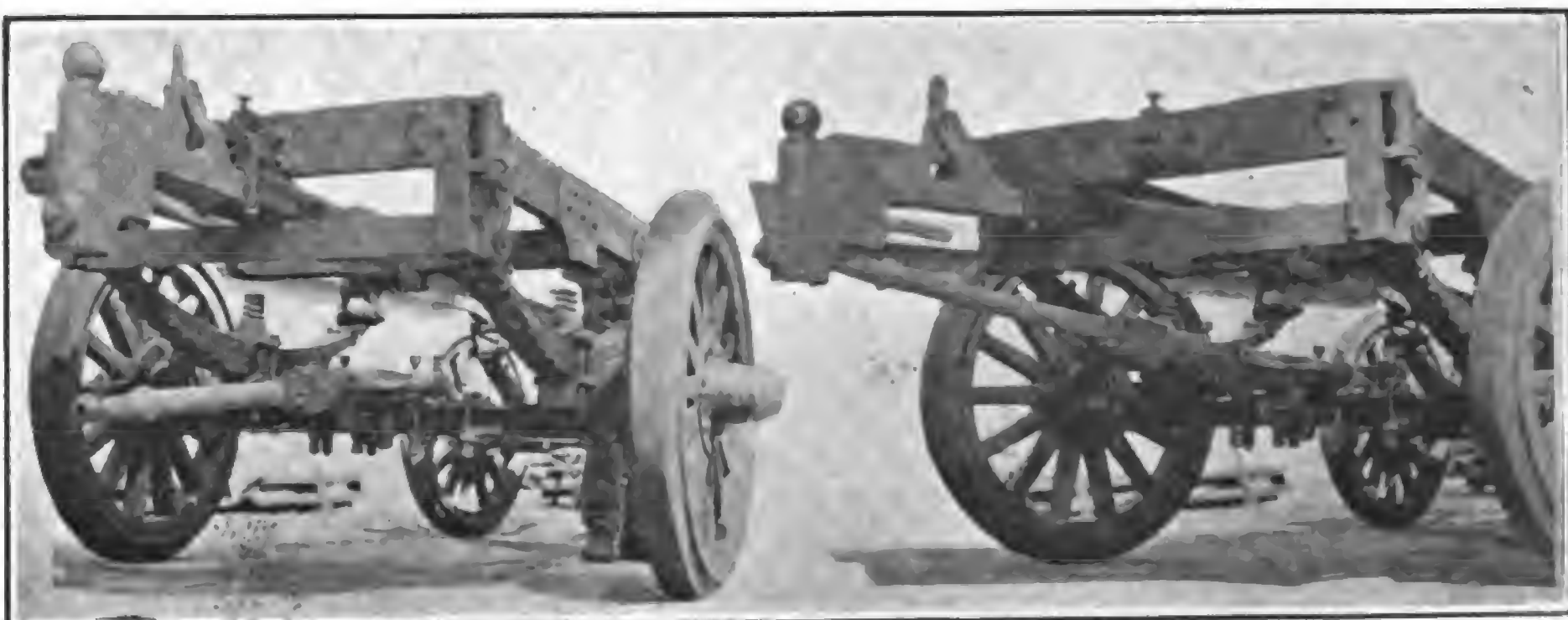
Fourth—Possibility of operating trailer and turning in narrow alleys.

Fifth—Simple body construction, assuring complete discharge of the load.

Sixth—Loading edge from ground; 2½-yard body 59 inches, 3½-yard body 62 inches.

Seventh—When body is dumped the lower edge of body clears dumpage.

Eighth—Body is under constant control of cables, eliminating the jumping of the body from the trailer.



Left: Steering Pole Uncoupled for Backing Trailer; Right: Steering Pole Replaced in Coupling Head in Hauling Position.

Ninth—Quick operation, as it takes only 50 seconds to raise the body to complete dumping position and after dumping the body returns to horizontal position by gravity.

Tenth—Light weight of the entire outfit in comparison with the usual drop frame construction, which will permit hauling by mules or horses.

The coupling bar, which forms the connection between the truck and trailer, has the same connecting device as the wagon pole, which is used when horses are hitched to the trailer.

RHODE ISLAND FEES TRIPLED.

Under the new Rhode Island law, to go into effect July 1, increases in fees on trucks will amount to about 200 per cent. Passenger cars and trucks will be assessed 25 cents per horsepower and 25 cents per hundred pounds of gross weight, if equipped with pneumatic tires. If the vehicles are equipped with solid rubber tires the rate of 35 cents per 100 pounds will be charged. For vehicles with metal tires the rate is 50 cents per 100 pounds.

Trailers will be assessed 15 cents, 25 cents or 35 cents per 100 pounds the rate to be charged depending upon whether the car is equipped with pneumatic, solid rubber or metal tires.

Dealers will be charged \$10 a car, with a minimum of \$30. The present rate is \$5 a car, with a minimum of \$25.

The formula for reckoning horsepower that has been used by the automobile department for the past 12 years will be continued. It is the National Automobile Chamber of Commerce rating and is as follows:

Square of the bore, multiplied by the number of cylinders, divided by 2.5.

The computed weight upon which vehicles will be assessed will be in the case of passenger cars the actual weight of the car, plus 150 pounds for each passenger seat. In the case of commercial vehicles the weight will be the actual weight of the vehicle plus the manufacturer's rated load carrying capacity.

Ten thousand American motor cars will be marketed this year in Argentina.

TRUCK HAULS CIRCUS FOR SEVEN YEARS WITH \$100 REPAIR BILL

Since 1914 a Garford motor truck has traveled the highways and byways as far west as Utah and south to Georgia, carrying a menagerie of small animals during the spring and summer months. Winters it has been utilized in commercial hauling in whatever city the owners, Mr. and Mrs. Kelly, elected to make their temporary home. During the period of county fairs in the fall the exhibition is augmented by the addition of a troupe consisting of eight performers together with the necessary tent.

The owners feel a marked degree of appreciation of the wonderful service which this truck has given them. They write the factory as follows: "We feel that the entire expense including the engine, aside from minor replacements, has not exceeded \$100. We feel that this is a wonderful record, considering the use that this truck has had, and the distance which it has traveled. The record that this truck has given surely speaks well for the Garford quality and construction."

With the uncertainty of the present day transportation, the continued success of traveling enterprises such as shows, circuses, etc., has become seriously jeopardized and many have turned to the motor truck as their salvation. This record of motor truck serviceability keenly interests those who must face this situation and seek a remedy—a substitute for railway transportation.

300 ARMY TRUCKS SOLD.

Something like 300 motor trucks were sold at auction by the government at Camp Jesup, Ga., in less than seven hours one day last month. Prices ran from less than \$100 to \$1100. The vehicles ranged in capacity from one-quarter to five tons. Dealers and speculators were among the buyers. A number of bidders were from the North and East.

CALIFORNIA ROADS HOLD UP.

A thorough investigation of California's highways by the Bureau of Public Roads of the United States Department of Agriculture shows that 87½ per cent., or 1262 miles of the concrete paved highways are in good condition.

California's concrete pavement is practically all four inches thick. The use of this thin slab made it possible to give a large part of the state good highway service at a reasonable cost. The design was determined nearly two years before the heavy traffic came, so that, measured by results, the California commission's work appears to have been a success.

The bureau found the four-inch slab inadequate (the commission itself has abandoned it in favor of a five-inch reinforced concrete design), and advises that experimental sections be made on the unfavorable soils. It also finds that the ¾-inch carpet coat, famous in California, does not give a service commensurate with its cost. Of interest in all parts of the country is the bureau's finding that there is nothing presented by the entire California study which indicates that concrete is not a successful pavement. Simple, satisfactory methods for classifying the conditions of concrete roads have been developed from this study, which will be found invaluable in classifying roads in other states.

BONNER FWD SALES HEAD.

D. Henry Bonner, recently in charge of the branch house organization of the Ford Motor Co., has been made sales manager of the Four Wheel Drive Truck Co. of Clintonville, Wis., manufacturers of the FWD truck.

Mr. Bonner was associated with the Ford Motor Co. for over seven years in various capacities. He was superintendent at Cambridge, Mass.; assistant manager at Rochester, N. Y., and assistant manager at Pittsburgh. For his recognized ability in management and sales he was brought to Detroit over three years ago and put in charge of the work from which he resigned last January.

His new connection is with a strong, well managed concern.

PACKARD BONDS QUICKLY SOLD.

An issue of \$100,000,000 bonds by the Packard Motor Car Co., Detroit, was recently subscribed in less than two hours, an indication that the United States is sold on the future of the automotive industry. The Packard company will use the money as working capital and plans increased production at once.

NEW TRAYLOR OFFICIALS.

The Traylor Engineering & Manufacturing Co., Cornwells, Pa., has made a number of changes in its truck and tractor division. New officials are: Assistant sales manager, W. G. Clay; chief engineer, C. H. Patten; production engineer, J. L. Fulton.



The Garford Truck Used to Haul Circus for Seven Years at Minimum Expense. Mrs. Kelly Driving.

IMPROVED TWIN CITY MODELS

THE Minneapolis Steel and Machinery Co., Minneapolis, Minn., distributes its products through the Twin City Co., a subsidiary, which markets Twin City trucks to all parts of the country.

The company is now in production with a new 3½-ton truck and also a two-ton job, both of which have been developed by the company engineers after careful study of the farmers' and general transportation needs.

The new 3½-ton job is powered by a Twin City tractor engine having 16 overhead valves. The engine is a four-cylinder, four-cycle, I-head type, having all parts enclosed to prevent the entrance of dust. The bore is 4¼ inches and the stroke six inches, developing 36 horsepower at 1000 revolutions per minute, and having an S. A. E. rating of 29 horsepower. The governor is a Twin City fly-ball type, which governs the engine speed very close.

The carburetor is a Wheeler-Schebler 1¼-inch Model "A," fitted with auxiliary fuel control from the dash. Fuel is fed to the carburetor by means of a Stewart vacuum tank connected with the main tank, which is located under the driver's seat and has a capacity of 25 gallons. Ignition of the engine is by Bosch high-tension magneto fitted with impulse starter. At 1000 revolutions the truck operates at 11.5 miles per hour.

The cooling system consists of a centrifugal water pump driven from the timing gearset of the engine, a 20-inch steel fan driven by two-inch fan belt from the engine, and a spring mounted Spirex core radiator mounted in front of the engine on the truck frame.

Lubrication of the engine is by force feed through a drilled crankshaft to the main and connecting rod bearings and camshaft bearings, the excess oil draining through the pressure valve into the timing gearset. Excess oil thrown off by the connecting rods lubricates the cylinder walls and pistons.

The clutch is in unit with the engine and is a Borg & Beck dry plate type. The transmission is a Fuller G-5 independent type, hung amidship and is fitted with four forward speeds and one reverse, and is also equipped with power take-off to which an air pump may be attached when pneumatic tires are used.

The propeller shaft is divided into two sections. The forward section connecting the clutch and transmission is fitted with flexible joints, while the rear section connects the transmission with the driving worm of the axle and is fitted with Spicer metallic joints. Both shafts are tubular, this construction having been found to have the greatest strength for transmitting the driving power of the engine to the axles.

Timken Worm Drive Rear Axle.

The rear axle of the 3½-ton Twin City truck is a Timken worm and worm wheel type, fitted with Timken tapered roller bearings. The gear ratio on high is given as 10 1/3 to one.

The front axle is I beam drop forging fitted with Timken tapered roller bear-

ings in the axle stubs and also the steering spindles.

The steering gear is a Ross and is fitted with a 22-inch wheel having the throttle and spark levers located on a quadrant under the wheel and fastened to the steering post, while suitable linkage connects the steering gear with the front wheels.

The truck frame is made unusually heavy and is eight inches deep, made of hot rolled steel, reinforced by heavy cross members, and extra large gusset plates at the corners, reamed and hot riveted for extreme strength.

The rear springs are 3½ inches wide and 54 inches long, made of chrome vanadium steel, while the spring clips, center bolts and nuts are designed to S. A. E. standard and all springs pins are held secure by S. A. E. standard machine bolts fitted with castle nuts and cotter pins. The front springs are 44 inches long by three inches wide.

Spring shackles in conjunction with radius rod construction give a full floating spring effect. The shackles are large size drop forgings, provided with phosphor bronze bushings and patented oil kips. The front shackle of the rear spring is fitted with nickel steel pins, heat treated and ground, while the rear shackle carries similar pins and is mounted on a shaft (extending through the chassis frame), which strengthens the frame and keeps the rear spring shackles in alignment.

The fore ends of the front springs are attached rigidly to the frame through special design castings, while the rear ends float in shackles, the centers of which are incorporated in the rear engine supports.

Smith malleable wheels are regular equipment on this model and they are fitted with 36x5 inch solids on front and either 40x5 inch dual solids or 40x10 inch single solids on rear, as desired.

Equipment includes two side lamps, tail lamp, warning signal, speedometer, bumper, jack and set of tools.

The capacity of the Model AW 3½-ton truck is given as 7000 pounds and the weight 6800 pounds, distributed as follows: 3100 pounds on the front axle and 3700 pounds on the rear axle.

The body allowance is 1500 pounds and two wheelbases may be obtained, the standard wheelbase is given as 168 inches and will accommodate a body 13 feet long and seven feet wide, while the special wheelbase of 156 inches is adapted to dump body service, and will accommodate bodies 10 feet long by six feet wide and 18 inches deep, having a capacity of 3½ cubic yards.

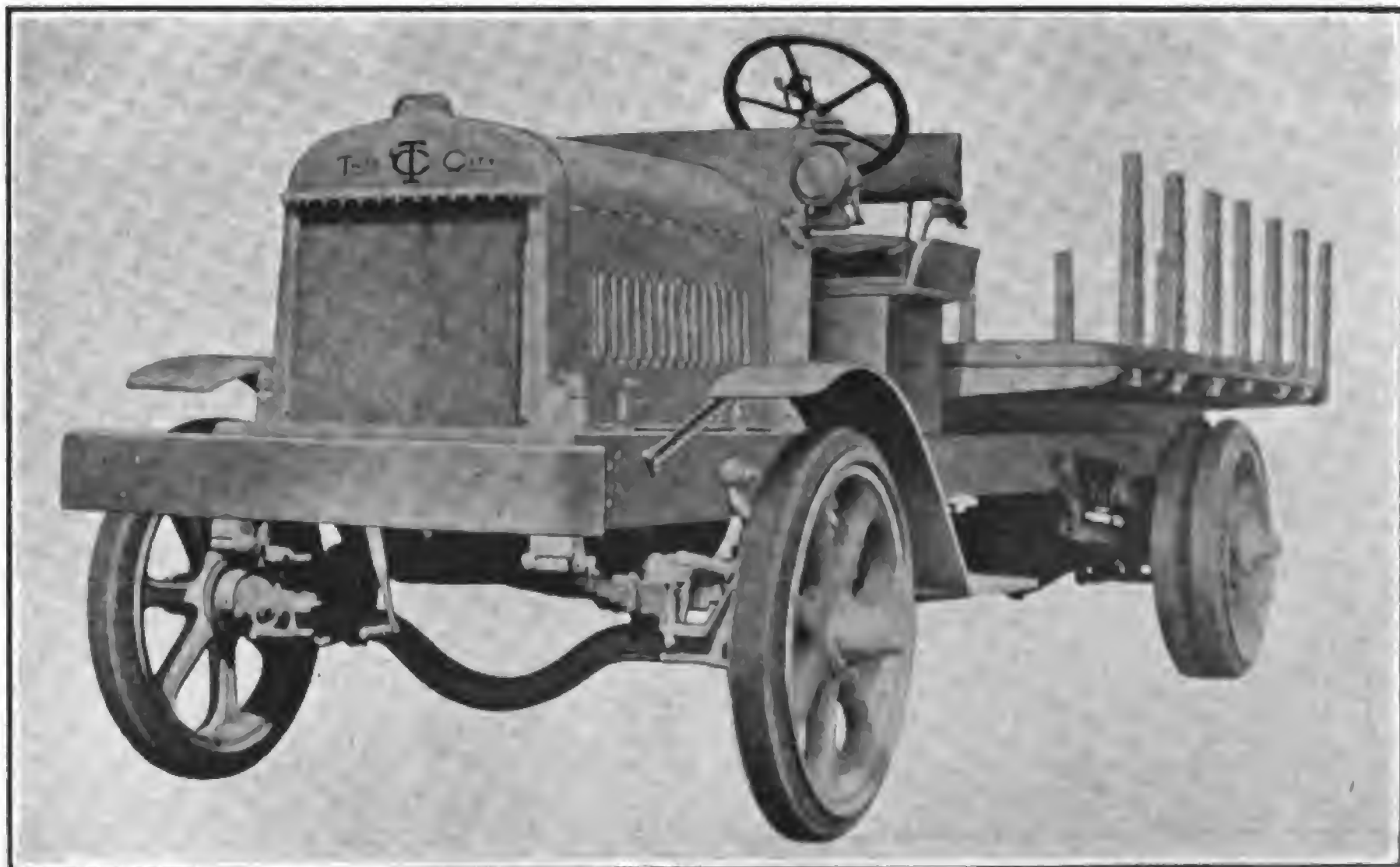
The tread of this truck is given as 66¼ inches front and 65¼ inches rear.

Twin City Model BW Two-Ton Truck.

The two-ton Twin City motor truck is constructed along similar lines as the 3½-ton, but varies from it in dimension of units and is equipped with a Model ITU four-cylinder Buda engine, having a bore of four inches and stroke of 5½ inches and is especially designed for heavy duty service, with ability to operate on low grades of gasoline.

A detachable head allows inspection of the valves and combustion chamber, also for valve grinding operations. The engine is capable of delivering at 1100 revolutions per minute 29 horsepower, or under the S. A. E. rating 25.6 horsepower, which is considered amply sufficient for a truck having a capacity of 4000 pounds. The engine is equipped with Simplex governor, Wheeler-Schebler carburetor, Bosch high-tension magneto with impulse starter, and the cooling system consists of a centrifugal water pump driven from the timing gearset, a 16-inch four-blade fan driven by belt from pulley on timing gearset and a spring mounted radiator built up with cast iron top and bottom tanks and having a Spirex core.

The lubricating system of the two-ton engine is by geared pump and force feed through a drilled crankshaft to main journals, connecting rods and camshaft bearings, the excess oil lubricating the



The Twin City 3½-Ton Model Which Suggests in Appearance the Ruggedness It Has Demonstrated in Actual Work.

walls of the cylinders and pistons and the overflow from the system lubricating the timing gearset.

Standard Units Used Throughout.

The clutch is a Fuller dry disc type and the transmission gearset, also of Fuller manufacture, is equipped with three speeds forward and one reverse. The gearset and clutch is in unit with the engine and is fully enclosed in a casting bolted to the flywheel housing. The propeller shaft is in two tubular sections, fitted at either end with metallic universal joints and is provided with a center floating bearing, which prevents the shaft from whipping. The bearing is bolted to the cross member of the frame at the rear of the driver's seat.

The rear axle is a Clarke internal gear type having an eight to one gear ratio on high speed, while final drive is through internal gears to the driving gears in the rear wheel drums.

The tire equipment consists of 36x4 inch tires front and 36x7 inch solids rear or cord pneumatics may be purchased optional at extra cost as follows: 36x6 inch front and 40x8 inch rear.

The springs of the two-ton truck are chrome vanadium steel, the front springs being 40 inches long and 2½ inches wide and the rear springs 54 inches long and three inches wide.

The frame is six-inch, hot rolled steel, held rigid by cross members secured by large gusset plates reamed and hot riveted.

The steering gear is a Ross type "BL" fitted with 18-inch steering wheel and is connected to the front wheel steering spindles through suitable linkage.

The wheelbase of the two-ton truck is given as 150 inches standard and 140 inches special for dump body service. In the regular body sizes this gives a space which will take a body 11 feet long by six feet wide, and in the special wheelbase for dump bodies will accommodate bodies nine feet long by 4½ feet wide by 16 inches deep, having two cubic yards capacity. The length of the frame back of the driver's seat in the standard job is 132 inches and the width 33 inches. The tread is given as 58 inches for the front and rear wheels, with a distribution of weight for the chassis of 2300 pounds front and 2500 pounds rear.

INITIAL PURCHASE OF 100 WHITE'S IS SOUTH'S RECORD ORDER

Motor truck equipment has been purchased for the recently organized Southeastern Express Co., which will begin operations on May 1st in the territory from New Orleans to Washington and from St. Louis and Cincinnati to Jacksonville. J. B. Hockaway, president and general manager, has placed what is undoubtedly the South's largest order to the truck industry and has given immediate shipping instructions covering the first 100 trucks.

In referring to the purchase, President Hockaday said that White trucks had been adopted as the company's standard equipment. Besides the trucks now being delivered the additional requirements of the company will be met by the time the company is ready to begin operations.

It is the purpose of the company to assign the trucks to territories where the volume of express shipping is great enough to warrant the use of a fleet of trucks or where motor equipment will make it possible to render a superior service.

Most of the trucks ordered by the Southeastern are two-ton models, mechanically the same as the United States government adopted for the standard of class A army trucks during the war. They are being mounted with solid panel bodies painted dark green with black striping and red chassis.

In the plans of the company the utmost importance is attached to the selection and operation of motor vehicles. At the outset it was recognized that the highest standard of truck performance is essential to the business of transportation. In no other field of haulage has there been a greater insistence upon downright operating merit than in the professional transportation field. This is not only true of the large express companies, but is also true of 500 miscellaneous transportation companies whose only source of income is the earning power of their 5000 White trucks.

Standardization of truck units in all industries is becoming more and more

pronounced as experience with fleets increases. While many economies of operation and maintenance have been realized by local firms through the use of trucks of identical design, the benefits of standardization are even greater when fleets are operated at numerous points by one concern.

In standardizing his company's equipment after consultation with the White company, President Hockaday based his action upon a motor truck experience which dates back to the pioneer installation of White trucks in the express business of the South when Mr. Hockaday was vice president of the Southern Express Co. Since then his experience with truck transportation has broadened until it has covered large scale fleet operation in its present highly developed form. In this respect the Southeastern Express Co. avoids all the uncertainty of motor truck experimentation and begins business with high standards in equipment and in the methods by which it will be operated.

Of great importance in maintaining proper service to shippers is the organization back of the equipment employed. To properly service the thousands of trucks in the Southeast, the White company maintains factory branches and distributors who are equipped to meet any service need. No less than 50 White service stations are located in the territory to be served by the Southeastern Express Co.

THE FIRE FIGHTING TRUCK.

An excellent concrete example of the progress made by inventive genius in three-quarters of a century is given by this photograph. The old hand pumping engine and hose cart, acquired by the village of Yantic, town of Norwich, Conn., in 1847, show the stage of development which fire apparatus had reached at that time. Forty men could pump a one-inch stream of 180 gallons a minute to a height of 125 feet with the old engine.

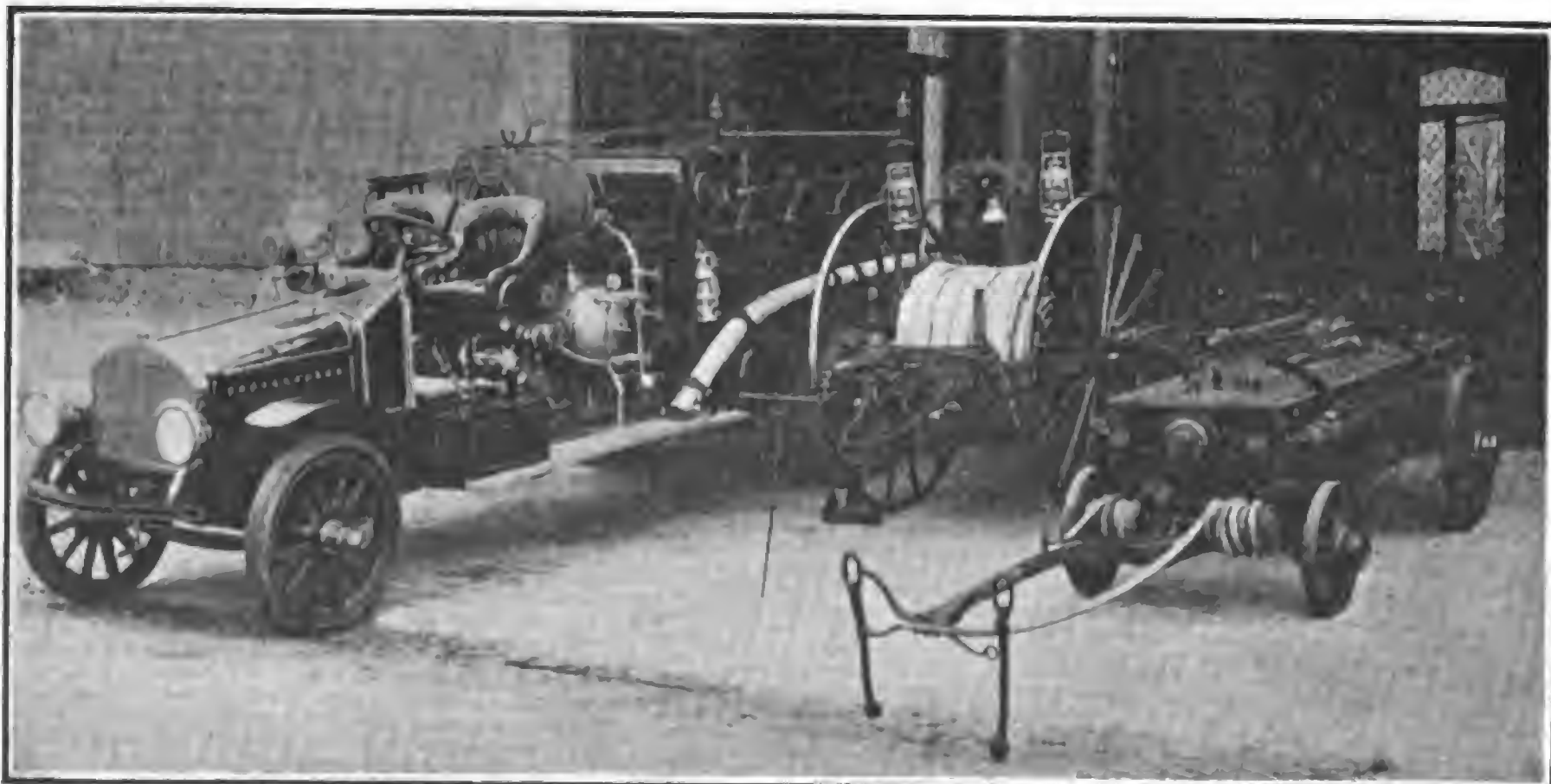
The 1921 product needs only one operator and throws a one-inch stream of 300 gallons a minute to a height of approximately 160 feet. It is a Mack AB triple combination pumping engine, chemical and hose car, which carries all the equipment necessary to fight a fire.

BECK-HAWKEYE CHANGES.

The Beck-Hawkeye Motor Truck Works, Cedar Rapids, Ia., will henceforth operate under the style of the Hawkeye Automobile Finishing Co. James G. Harper, who has been connected with the organization for the past 11 years, has been named general manager. New interests are in control.

RAINIER GETS CROCKER.

The Rainier Truck Corporation, Flushing, L. I., has engaged E. S. Crocker as chief engineer. He was formerly with the Chalmers Motors Co. and during the war helped develop the four-wheel drive artillery tractor.

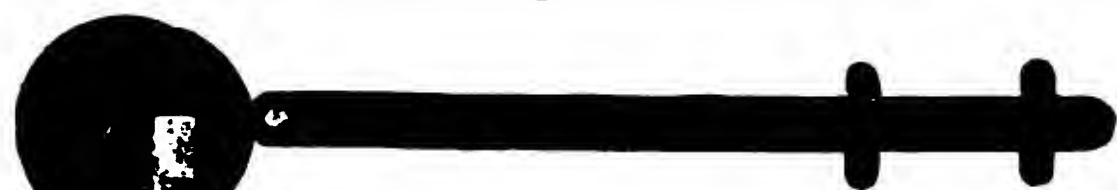


A New Mack Fire Fighting Truck and the Apparatus That Was the Best to Be Had Three-Quarters of a Century Ago.

STANDARD EQUIPMENT FOR MOTOR TRUCKS

COMMERCIAL vehicle manufacturers are rapidly adopting the practise of adding as standard equipment on trucks before they leave the factory many of the so-called accessories offered for sale to truck owners by accessory dealers.

The passenger car manufacturer, in the early days, had this problem to solve,



Hindview Mirror Necessary Equipment in Many States. The Long Arm Allows Mirror to Project Far Enough to Give Clear View Past Wide Truck Body.

and the day is at hand when the truck manufacturer encounters the same situation. Passenger cars, especially of the higher grade, are now equipped with many articles which previously were considered as extras. Competition had something to do with forcing the manufacturer to add these devices and now the buying public expects them as regular equipment.

Rear View Mirror a Necessity in Many States.

In many states it is compulsory to fit a mirror to the front guard on the side of cab adjacent to the driver's seat. Usually this is the left side, as most trucks are equipped with left hand steering wheels. The object of placing the mirror at this point is that the driver may see traffic in the rear and govern his driving accordingly. The mirror is placed far enough out at the side so that the view is unobstructed past the cab and load, thus giving the operator a clear rear view. In many states where the population is dense and vehicle traffic heavy, laws of this nature are necessary to forestall accidents. A mirror is inexpensive and when properly attached at the factory becomes a permanent part of the chassis and will last practically as long as the truck.

A device designed especially for motor truck service should be made much heavier than the kind usually available in the accessory stores and should be constructed to withstand the constant vibration of commercial vehicles and should be hot riveted to the front guard and have a reinforcing piece of metal underneath the guard, or be mounted in such a manner that vibration will not effect its usefulness.

All-Weather Cabs.

Manufacturers of cabs and bodies for commercial vehicles are beginning to realize that to sell their products they must be comfortable at all seasons of the year. The day has passed when the manufacturer could turn out a cheap open cab and sell his product readily to the truck maker, the latter in turn selling it through his distributor to the purchaser. As many commercial vehicles are now being used for day and night service the year round, fleet owners are paying more attention to the comfort of the driver, with the result that cab manufacturers are spending valuable time

developing satisfactory cabs, constructed in many cases of wood and in others of all steel, fitted with glass windows in the sides and back which drop down into pockets during warm weather and may be raised during cold seasons, thus protecting the driver from the elements and making the cab far more comfortable.

Windshields especially adapted for motor truck use are also furnished with these cabs, fitted with heavy, specially constructed glass, which will shiver but not break when an accident occurs. The shield is constructed in sections, usually two or more to a shield, which allows the upper section of the shield to be opened during warm seasons and closed in cold.

The day has gone when truck manufacturers could equip their cabs with curtains for sides or windshield and expect the customer to be satisfied. Many a driver has cursed a flapping shield made of this material, fitted with celluloid center, through which he was supposed to see the road. Such a shield was not at all bad when new, but after a few months of use it would become old and discolored, proving difficult to see through, or a strong gust of wind would tear a hole in the center of the celluloid, chilling the driver.

The enclosed cab of either wood or steel construction, fitted with doors and heavy glass side and rear windows is a step in the right direction and should be adopted as standard equipment with motor truck manufacturers. Any accessory that will give comfort to the driver of a truck is well worth adopting, as he is obliged to drive in all kinds of weather and anything that will tend to his comfort will also benefit the truck or fleet owner, reducing his operating expense, allowing him to secure a better class of drivers and also enabling him to have his trucks operate on a time schedule, which will also bring him a larger amount of business.

Cab Heaters Operated at No Cost.

Along the line of comfort for the motor truck driver may be mentioned the cab heater which has been designed to

operate on the exhaust gases from the engine.

The Perfection Heater Co., Cleveland, O., has probably advanced further along this line than many of the heater manufacturers, and has designed heaters for all types of passenger cars and truck cabs. The cab heater is a small unit, which is placed at the rear of the floor near the driver's feet, and is connected to the exhaust pipe by a flexible metal tubing which conducts the exhaust gases to the heater coils.

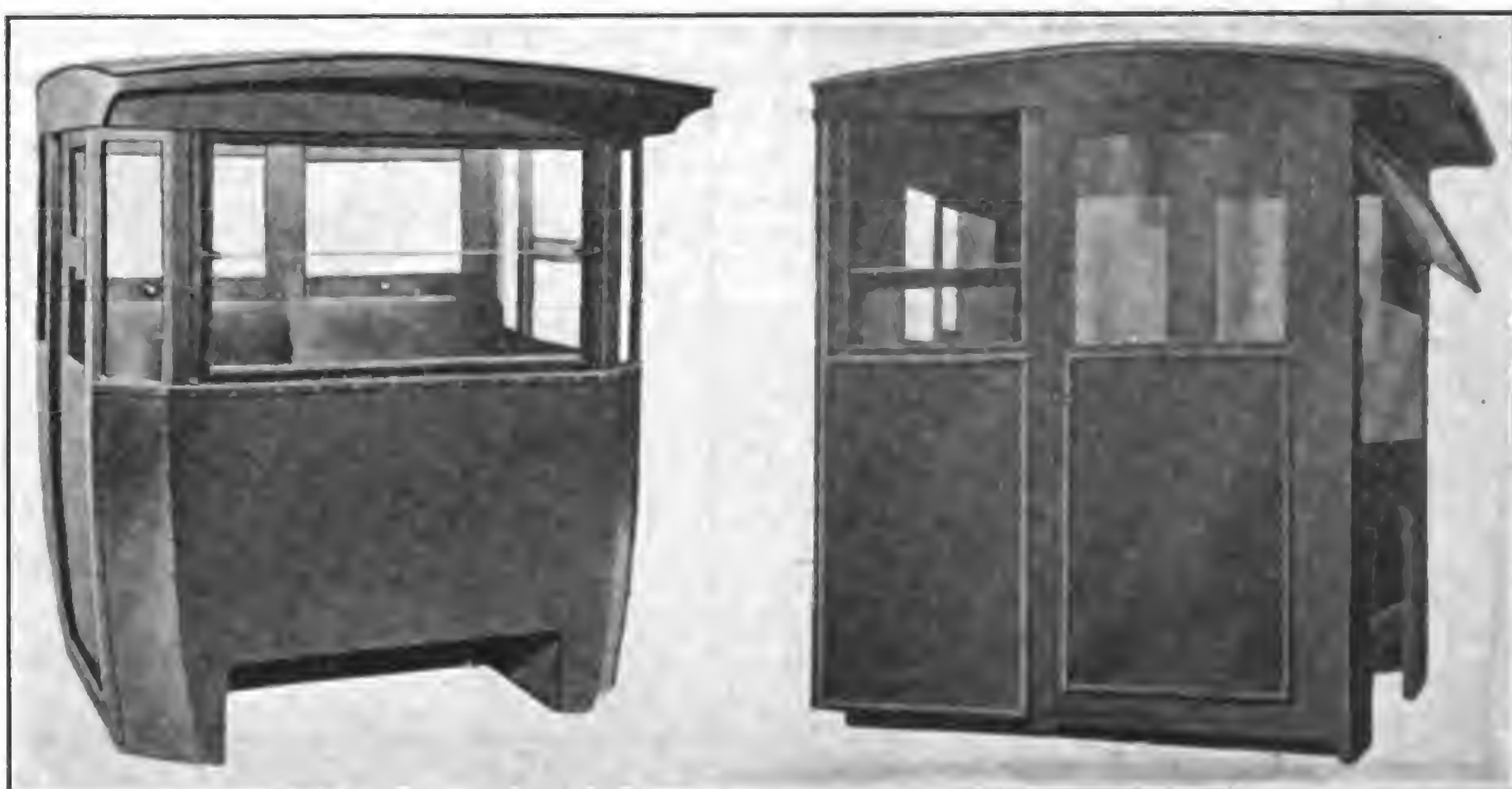
A shut-off valve is provided which allows the driver to shut off the heat when it is not needed and turn it on when he desires to warm the cab. No expense, except installing, is entailed in its use, and can be easily installed at the factory manufacturing the truck at a very small expense.

Instances are given where trucks so equipped have been operated continuously during cold weather, while trucks without the heater attachment have been run very little, thus showing the preference given by operators for the trucks equipped with cab heaters over those that were not so equipped.

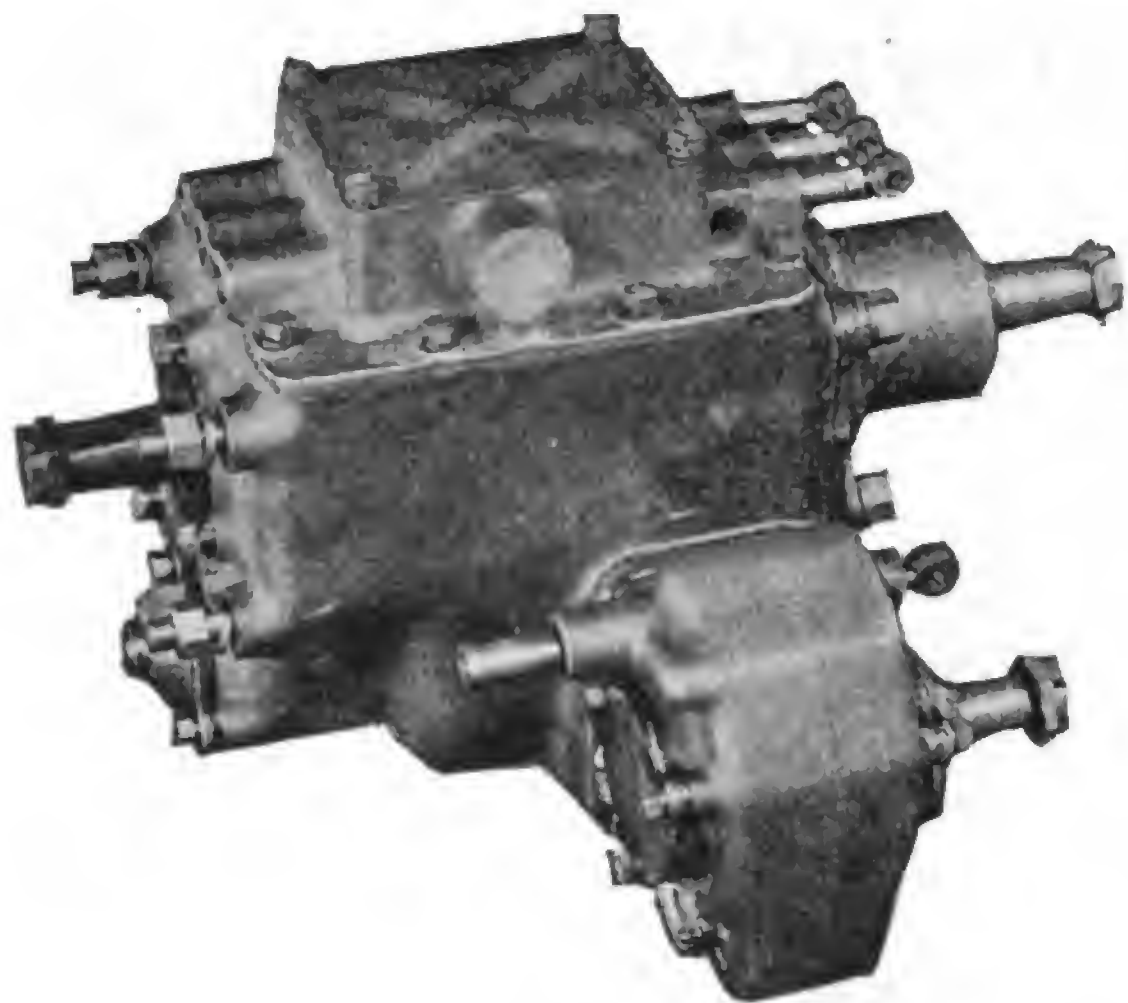
There is no question but that it is only a matter of time before truck manufacturers will adopt the cab heater as standard equipment and will include it with their chassis and cab. Fleet owners and drivers are doing much to hasten the day by insisting that heaters be fitted to the trucks they purchase at the time of closing the deal, thus showing the dealer and the manufacturer the trend of sentiment in regard to this important accessory.

Starting and Lighting Systems Necessary.

In studying the design of new heavy duty engines placed on the market for the 1921 season, it is noticeable that many of the engine manufacturers are constructing their engines with the idea in mind that electric starting and lighting outfits probably will be installed by the motor truck manufacturers. Provision is made in casting the upper section of the crankcase and in assembling the engine to place these units in conventional positions. The units may be added



Improvements in Enclosed Cab Construction Make for Comfort for Driver in Stormy or Cold Weather.



Transmission Power-Take-Off Provides Ready Means of Supplying Power to Operate Many Devices Which Shorten Time and Save Labor.

by the manufacturer of the motor truck if he so desires, giving him the opportunity to choose the starting and lighting units which he wishes to install.

Under these conditions the manufacturer who does not add this equipment is standing in his own light, as there is no question but that starting and lighting units may be placed on motor trucks, even the larger sizes, and prove practical in service. Many trucks are already equipped with these units and are working successfully, so that it is only a matter of time before the units will be included under the head of standard equipment. The argument is sometimes advanced that the vibration and the stress of the truck frame would prove injurious to the starting battery. This argument has been disproved by mounting the battery in a flexible mounting, which will allow it to follow the stress of the frame and not be effected by vibration.

Another objection offered is the claim that it is not practical to start a heavy duty truck engine in this manner as the many stops and starts would soon exhaust the battery. This is true to an extent, but the same argument was used in connection with passenger cars in the early days of the electric starter. At the present time it is impossible to sell a passenger car without an electric starting and lighting system, demonstrating how popular the device has become with the public. In a few more years time a similar condition will prevail in regard to motor trucks.

There is no question but what the electric starting and lighting system is practical for starting the heavy duty truck engine and within a short time it is bound to be generally adopted as standard equipment on all smaller sizes and most of the larger sizes of motor trucks.

Power Take-Off Equipped Transmission.

Standard parts manufacturers who build transmission gearsets for commercial vehicles are beginning to equip their products with a power take-off, which may be used in a variety of ways. Commercial vehicle manufacturers who use giant pneumatic cord tires as regular equipment, equip their trucks with a power take-off transmission to which a

power pump is connected, allowing the large size tires to be easily inflated by the power developed by the engine.

Advantage is also taken of this device to supply power through suitable gearing and on a shaft extending to the rear of the truck frame, equipped with a belt pulley and supplying power to operate light farm machinery, such as ensilage cutters, feed grinders and many other power-operated machines too numerous to mention. This device may also be used by telephone and telegraph companies in hauling lead cables, containing wires, through underground conduits. For this purpose a winch is fitted to the rear end of the truck frame, consisting of a winch drum mounted on one end of a drive shaft and a worm wheel on the opposite end. Power is supplied to the worm wheel from a worm on the extended shaft, which receives its power from the power take-off at the transmission. The motion of the drum is controlled by a lever at the rear of the truck, which

vices which will allow him to receive full benefit of the power take-off.

The additional cost of this type of transmission is small and adding it to the unit will increase the truck's field of usefulness and help to increase sales.

Power Take Off Equipped Engine.

Certain tractor manufacturers who recently entered the truck field after exhaustive study of the farmers' needs, are now producing a power take-off which is connected to the engine crankshaft in front of the radiator. The power device consists of a special cast housing, which is bolted to the chassis frame under the radiator. The housing contains two bevel gears, one on the extended shaft, which is connected to the engine crankshaft and the second gear meshing with it and fitted to a shaft at right angles to the extended shaft carrying a belt pulley at the end. A throttling governor is also fitted to the belt pulley, which governs the speeds of the engine according to the load which it is pulling. Provision is also made for starting the engine with the hand crank in the usual manner at the forward end of the casing.

The advantages of this equipment are quickly realized when one understands that the farmer is often pressed for time and needs all available help and power that he can muster to harvest his crops in time. A truck with this device is able to displace the tractor for power purposes and leave the latter free to work in the fields, while the truck, with the power take-off equipped engine, is able to take its place in operating power machinery, such as cutters, grinders, threshing machines, etc.

Motor truck manufacturers who plan their trucks so that a unit of this nature may be easily attached and detached will find that their products will be in greater demand than ever, especially among the power farming trade. The use of this device is not confined to limits and its power may be utilized in many ways not yet suggested, but which come to owners of these units as they work with them.

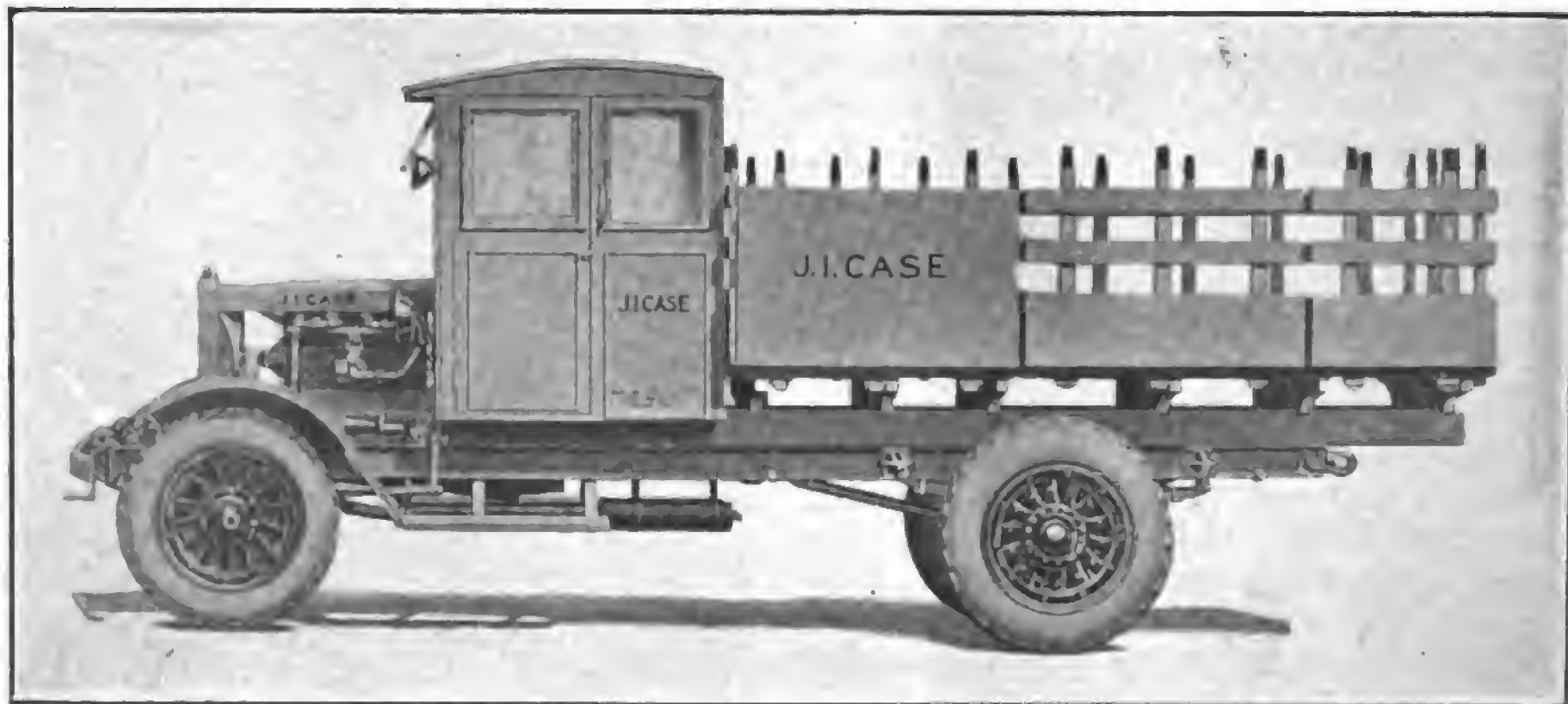
Many farmers have tried taking power from one of the rear wheels of a vehicle by running a belt around the wheel over the tire and running it to the machine to be operated. This practise is not recommended either by the manufacturers or engineering experts because of the dif-



Perfection Cab Heaters Also Add Materially to Comfort of Driver in Winter.

connects or disconnects the power of the engine.

While this latter device is not required by all truck purchasers, the possibilities of its use are practically unlimited and by equipping a truck with the power take-off type of transmission the owner is given the opportunity of fitting other de-



Arrow Indicates Engine Power-Take-Off. A Pulley Driven from Engine Crankshaft Supplies Power Which May Be Used to Drive Farm Power Implements, Such as Thresher, Silo Filler, Wood Saw, Etc.



Power Winch Driven by Power from Power-Take-Off of Transmission Loading Heavy Machinery on to Motor Truck.

ifferential which is located in the center of the live axle, allowing one wheel to drive faster than the other when rounding corners. The differential is made up of four small gears, which are allowed to turn freely on four arms of a spider, the gears meshing with the bevel gears of the driving axle shafts. When using one of the wheels for power the other axle does not revolve, consequently excessive wear takes place in the small differential gears, which soon wears them, making replacement necessary and costly.

Many Uses for the Power Winch.

Trucks equipped with power take-off attachment at the transmission are easily equipped with a power winch which makes possible the operation of many types of special apparatus which otherwise would have to be operated as separate units.

This device is mounted on the front end of truck body and proves very handy for hauling out vehicles that have become stuck in the mud, hauling heavy weights onto the truck, raising heavy weights into buildings and by adding a boom at the rear end of the truck the usefulness of the winch may be greatly increased.

By rigging a two or three-pole derrick on the truck body of sufficient height, heavy weights, such as safes, may easily be raised by the engine-powered winch to practically any given height, the only limit being the height of the derrick.

Municipalities find the use of a winch-equipped truck very useful in loading heavy pieces of machinery, pipe, asphalt rollers, etc., as all that is necessary is to lay a temporary platform from the back end of the truck to the ground and haul the machinery onto the truck over the slanting platform.

Standardized Motor Truck Bodies.

There is a tendency among motor truck body builders to confine their building operations to as few styles of bodies as is consistent with good practice. Reasons for this condition include the high cost of labor and material which enter into their construction and a tendency of motor truck buyers to confine their purchasing to certain styles of bodies. Many fleet owners prefer a platform body, others a dump type of body and still others make use of a standard stake type, equipped with either top or bows and cover.

Certain manufacturers are at present building a combination body which combines the good features of the platform and dump bodies in one. Owners of this type of combination body find that it is especially useful as a dump body for handling material such as coal, sand, gravel, etc., while the change to the platform body, easily and quickly made, allows them to use it for hauling bales of cotton, heavy machinery, etc. Standard stake slat sides may be easily made and fitted to this body, which will adapt it for ordinary haulage work, and by using removable bows fitting the tops of the stakes, a cover is easily thrown over the top, protecting the load from the elements.

Enclosed bodies offer a different problem and the possibility of a standard body are rather remote, because each user calls for varying widths and lengths, special body heights and special covering material. However, with a little care and forethought on the part of the manufacturer a standard body may be developed, which will answer many of the purposes in motor trucking service.

Farm truck manufacturers are producing and selling with their trucks a combination body for farm service which combines several bodies in one, such as a grain tight body fitted with special unloading gate, rack sides, which allow the hauling of stock, and the sides made in such a manner that they form wings, allowing baskets of fruit or vegetables to be carried. In many sections a body of this type will meet with a ready sale. Still another company which manufactures a speed truck uses a combination

body on its product which has a carrying capacity of $1\frac{1}{4}$ tons.

This body is in the form of an open express and is fitted with adjustable stake irons which are clamped by a wing nut and bolt. A standard top, with six posts, may be fitted to this body, or a stake side body fitted with slats. The cab is also made in such a manner that it is easily fitted over the back and sides of the regular seat or may be dispensed with when the top and side posts are used. Many styles of bodies are shown in the literature covering this product and the possibilities of service are unlimited. This idea or variations thereof will undoubtedly be adopted by other organizations.

The object of standardization is to lessen the need of manufacturing a large line of bodies, many of which are called for but infrequently. When this is realized by truck manufacturers and body builders, the possibility of standard body units will be a fact and many dollars will be saved to both motor truck and body manufacturers.

Brake Improvement Necessary.

Motor trucks which are used continuously in service wear brake shoes rapidly, meaning that they must be relined frequently to keep the brakes in working condition. It seems strange that manufacturers have not given more thought to brakes, but depend wholly on foot or hand operation of the brakes to control the speed of the truck when descending grades. The engine and transmission gearset may be used provided that the driver understands how to use them to advantage without injuring the units, and thus save the brake shoes for emergencies.

Accessory manufacturers are beginning to realize that there is a need for a type of air brake which may operate on all four wheels, and one manufacturer is now in production with a device of this kind which is applicable to passenger cars. At present the system is available for Pierce-Arrows and other cars will be added from time to time.

The chief feature of a four-wheel braking system is the unusual stopping ability. This, of course, will greatly reduce the danger of accidents. The average stopping distance when equipped with this four-wheel hydraulic brake and traveling at 15 miles per hour, is nine feet; traveling at 30 miles an hour, 35 feet, and traveling at 60 miles an hour,



Typical Body and Cab Designed Especially to Meet the Demands of Farm Haulage.

144 feet. The advantages of this hydraulic system are claimed to be simplicity, equalization of braking on all four brakes, less friction and, therefore, less effort in operating them.

Essentially the system employs brake bands of the usual type. The old brake pedal is removed and a new pedal pad and plunger installed. Depression of the pedal pushes down the piston of the master cylinder the pressure exerted extending through the oil pipes to the individual cylinders on each brake. Relieving springs move the brake bands away from the brake drums when the pressure is released. Heavy copper tubing is used to connect the master cylinder and individual brake cylinder, and connection between frame and axle is by a combination swivel and slip joint. The master cylinder is always filled with oil, due to the fact that a small reserve tank fitted with two automatic check valves between is used, so that if oil is lost it is automatically made up by drawing from the reserve.

The cylinder which operates the brake band is placed at the top and the band is anchored at the bottom. The oil pipe enters the fitting above the king pin, oil passing through a swivel joint at the front of the car and then through a C-shaped pipe to the brake cylinder. The swivel joint allows the pipe to swing free with the wheel. The rear drums are not disturbed, the old contracting mechanism being removed and the new mechanism being substituted in its stead.

The possibilities of a device of this nature are unlimited and its adoption in some form by motor truck manufacturers who desire to have their production give the utmost and satisfactory service in the hands of purchasers appears to be a matter of time. Knowing that air brakes are a fact and that they may be applied to passenger cars and will soon be manufactured and fitted to motor trucks, some owners are already demanding that the trucks they purchase be equipped with a time and labor saving unit.

Another important point in use of the motor truck equipped with hydraulic operated brakes is that trailers may also be equipped with this device and be operated in connection with the brakes of the truck, flexible tubing connecting the two or more units at the point of couplings in the same manner that electric and steam cars are connected and operated. A braking system of this type will make for greater safety of operation of heavy duty trucks and will give drivers greater assurance that they will be able to stop in emergencies and to better control the operation of their machines in traffic.

BUYS FORD CITY FACTORY.

The Selden Manufacturing Co., Detroit, Mich., which manufactures truck bodies, demountable wheels, etc., has purchased a large new factory at Ford City, a Detroit suburb, where it is already in production. The company is now fully prepared to turn out frames and springs in large quantities.

PLANS FOR SIXTH ANNUAL MICHIGAN PIKES TOUR

The Michigan Pikes association, under the presidency of Fred S. Case of Sault Ste. Marie, already is making active preparations for its sixth annual "Pikes" tour scheduled to start from Detroit the second week in July. In equipment, personnel and route to be covered, it will exceed even last year's trip, which was the first international journey of its kind ever conducted.

For the 1921 jaunt, Tour Manager W. D. Edenburn has laid out another trip that is to forge another international touring link for the motorists of both Canada and the United States. It is styled the "Around Lake Superior Tour" and will cover 1700 miles in 15½ days.

The tour will start from Detroit on July 9 and finish in the city of the Straits on July 26. It will traverse both the upper and lower peninsulas of Michigan, cut across the northern part of Wisconsin, follow the Lake Superior shore, through Minnesota and then cross the Canadian border to Ft. William and Pt. Arthur, Ont. At the Twin Ports of Ontario the entire tour party, with their cars, trucks and other paraphernalia, will board the steamer Noronic, and cruise to Sault Ste. Marie, Mich. From this point the tour will proceed to Detroit, crossing from the upper to the lower peninsula at St. Ignace.

Plans now call for the use of 80 motor cars and trucks to accommodate at least 350 persons on the two weeks' haul. As the big convoy passes through the country it will provide an object lesson in motor transportation to every community on the road. The truck section of the convoy which serves as the auxiliary of the motor car section will mount on separate vehicles, electric lighting equipment, fire prevention apparatus and ambulance service. Trucks also will be used to convey the tourists' baggage, blankets and cots.

Necessity of camping out on the 1921 tour will be obviated by reason of the fact that the tour passes through well settled territory where sleeping accommodation at the night controls can be obtained in armories or other large public buildings.

As in previous years every point on the route is to be the scene of a good roads rally with a big brass band and the arrival of the touring party to attract the crowd. The corps of speakers, which will be under the direction of Capt. W. S. Gilbreath, manager of the Detroit Automobile club, will be an all-star aggregation of good roads orators.

The working force at the U. S. Motor Truck Co. factory was materially strengthened the first of April, and present plans contemplate normal production by June 1.

Acme trucks will hereafter be distributed in Western Michigan by the T. G. McGurrian Sales Agency, Inc., Grand Rapids, Mich.

SOUTHERN MOTOR ORGANIZATION IS EXPANDED.

Jacques E. Blevins, president of Southern Motor Manufacturing Association, Ltd., Houston, Tex., has inaugurated a live selling and advertising campaign with excellent results. Southern Motor manufactures the Ranger passenger cars, Ranger trucks, Ranger trailers and Ranger tractors. Its modern, up-to-date plant has been built on 105 acres of ground along the ship channel about five miles east of the center of Houston's busy business center. When completed the factory group will have a floor space of almost 30,000 square feet.

Southern Motor maintains its main offices in the Beatty building, Houston, where Mr. Blevins has gathered round him men of long experience in the automotive fields. Prominent among the men of Southern Motor are: Jacques E. Blevins, president; D. D. Kahn, first vice president; C. E. Shively, treasurer; M. J. Kahn, secretary; Otto Bruenauer, general manager; C. A. Obermaier, engineering department; E. W. Houston, purchasing department; A. H. Rowan, production department; D. H. McBride, service department; E. C. Nicar, traffic department; W. O. Browne, sales department; E. A. Conrad, W. S. Reynolds, William G. McConnell, G. O. Pound, F. G. Smith, all of the sales department; R. G. Ruggles, advertising department, and R. E. Dunn, advertising department. To this personnel is constantly being added other automotive experts, for the sales, advertising and general publicity campaign of the company is being made effective through every known channel preparatory to world wide distribution for Ranger products, work which started with active production on a large scale this year.

INDUSTRY LEADERS CONFER WITH PRESIDENT HARDING.

Representatives of the automotive industry, led by Roy D. Chapin, chairman of the highways committee of the National Automobile Chamber of Commerce, conferred with President Harding last month and presented many important facts concerning the industry, including the following:

Three and a half billion dollars in 1920 sales give automobile industry a commanding place in nation's business.

The automobile is one of the five major units of transportation.

All businesses should be taxed on the same basis; but the automobile is now the target of special levies both national and state.

Roads are a major item of national expense and an essential aid to interstate communication.

The billion dollar available road funds should be supervised by a commission not under a department.

The President showed a high interest in road matters, declaring that in line with the policy of the chamber he would decline to advocate federal expenditure for roads unless the maintenance feature was properly cared for.

FONTAINE TRUCK EQUIPMENT FOR BRICK

THE American Truck Body Co., Inc., Martinsville, Va., is marketing a special type of body equipment which has been designed especially to meet the demands of brick manufacturers and contractors for a body that will handle brick at a considerable saving in time and labor.

The use of trucks for short hauls instead of shipping by rail is now a very common practise. The Fontaine delivery system enables the truck body to be loaded at a convenient place in the plant, after which the truck picks up the loaded body and carries it to its destination. While the truck is making the delivery, the duplicate body is being loaded. In unloading the body is set on the ground, two iron pipes are pulled from under the pallet and the body is pulled away from the brick, leaving them standing in a neat stack on the pallet. The truck then returns with the empty body, exchanging it for the loaded one. By regulating the loading the truck is continually on the road, and the time lost in loading and unloading is saved. No one beside the truck driver is required to pick up the loaded body and deposit the load.

When brick are dumped from a truck in the ordinary way a large percentage are chipped and broken. But with the Fontaine equipment there is neither jar or jolt as the body is let down on to the ground. On a city street it is required that the brick be stacked. This is easily accomplished with the Fontaine body and equipment. Again as the brick are packed on the body, count is kept of the brick loaded as a whole as the capacity of the body is known in advance.

New Fontaine Equipment Greatly Improved.

The new models of the Fontaine demountable truck bodies have several improvements over the older models. A great deal of care has been exercised in planning and designing this new equipment, the requirements of the brick manufacturer and the general contractor

being constantly kept in mind, so that this equipment may prove suitable under all conditions of transportation.

The equipment consists of a frame, fitted with a power hoist, cradle and two detachable bodies with pallets. The frame is bolted to the truck chassis by means of U bolts, eliminating the necessity of drilling additional holes in the chassis frame. The frame or bed acts as a support for the cradle.

The cradle moves back and forth on the frame in such a manner that the body may be set on the ground and then carried back on to the truck in the proper position for hauling. One important point to be considered is that the body is not lifted as a dead load, but is simply pulled over the arc of a circle, making it easier to handle the load. The hoist is sufficiently strong to negotiate any load within the capacity of the body and is so constructed that it is self-locking, holding the load in any position desired. Power to operate the hoist is derived from the power take-off of the transmission.

The detachable bodies are held in place on the cradle by means of two lateral arms, which securely hold a pipe on the body. It is stated that it is impossible for the body to slip in any way whatever. When it is desired to detach the body the equipment is lowered until the body is on the ground, and then the arms pass under the pipe. The body can be detached while on top of the truck as easily as when resting on the ground. The pallet acts as the tail gate of the



Type FF Equipment Mounted on Five-Ton Packard Truck.

body and is held in place by two iron pipes. When the load is deposited on the ground these pipes are slipped out of their fastenings and the brick are left stacked on the pallet as the truck body is pulled away. The pallets are of wood construction and are left under the stack until the brick are used. The entire equipment is fully covered by patents and is claimed to solve satisfactorily the difficulties that manufacturers and contractors have previously encountered in the handling of brick.

The body is constructed of 3/16 inch steel, thoroughly reinforced at all corners and hot riveted. The cradle consists of I beams and angles, fitted with rollers which operate on the tracks of the frame, and are designed to hold the body steady.

The frame consists of steel I beams and castings, reinforced and designed to conform to the truck chassis. The arms are strongly braced and made of steel angles, while the booms consist of steel pipes and the drums and cables are amply strong for all conditions of service.

The hoist is of the company's own design, unusually heavy to carry all loads imposed upon it. The gears are of cut steel, especially designed for the requirements of the hoist and are properly housed to protect them from dust and grit. The bearings are bronze and steel throughout.

Three sizes of Fontaine body equipment are at present available: Type F, 1000 standard brick capacity, designed for two or 2½-ton truck, priced at \$860; type FA, 1500 standard brick capacity, designed for three or 3½-ton truck, priced at \$1150; type FF, 2000 standard brick capacity, designed for five or six-ton truck, priced at \$1300. These prices are for complete equipment, including two bodies with frame, cradle, hoist and booms, f. o. b. Martinsville, Va.

NEW SCHACHT DISTRIBUTOR.

The Busy Bee Motor Truck Co., St. Louis, Mo., has been secured to distribute Schacht trucks in that territory.



Bricks Are Handled Without Breakage, Leaving Them Neatly Stacked Ready for Use.

HOW BUSINESS MEN CUT DOWN EXPENSES

American business men are cutting down their overhead expenses to meet the public demand for lower prices by demanding more work from fewer men and greater efficiency per inch of advertising: are depending more on budget and cost accounting systems; and are scrutinizing credits more closely.

THESE are some of the interesting facts disclosed by a survey just completed by the Department of Domestic Distribution of the Chamber of Commerce of the United States. Answers were received from some 2000 business men, retailers, wholesalers and manufacturers to questions having to do only with distribution costs and all answers dealing solely with production problems were omitted.

The replies for the most part report what has been done, but a final question asked for suggestions as to how the Domestic Distribution department might help in lowering the cost of merchandising to a normal basis. By far the largest number of answers said, "do something to lower freight rates."

The greatest variety of answers was received in response to the question: "What are you doing to reduce your personnel costs to a normal basis?" The general tone of these answers was not so much toward a reduction in wages as in reduction of numbers. An increased efficiency came with the cutting out of the dead wood. Only about one-fourth of those who answered had made any direct reduction of wages.

About 58 per cent. have reduced the number of employees and have done away with one-fifth of their workers. One-fifth reported that they had done away with or reduced commissions and bonuses. How many had been in the habit of giving bonuses, the answers do not show, but as this form of reward was perhaps very largely an outgrowth of war conditions, it may be fair to guess that it is fast disappearing with return to more settled times.

Saving in publicity found a wide division of opinion. More than a fourth of those answering said they had cut down advertising space. This was in part balanced by reports from many others who found depression a justification for an increased use of space. There was an actual increase in the use of circularizing as a means of publicity, an indication perhaps of a desire to move quickly accumulated stock.

There is an interesting note in this comment from one man: "We reduced our advertising appropriation by 50 per cent., but the signer is not sure that it was a wise move."

Frequently through the comment which accompanied the answers to the questions about publicity there appeared a note of determination not to cut off this method of selling, but to make certain of greater results. Just as the employer is calling for greater efficiency per man, he is demanding greater efficiency per inch of advertising.

Service Not Cut.

Surprisingly little was done by the 2000 business men in the cutting down

of service. A small percentage, 6.39, reported decrease in delivery service, while a still smaller percentage, 2.02, had increased deliveries. An occasional voice is lifted against the amount of service the present day buyer demands. One man writes:

"It is ridiculous the amount of service the public receives at the hands of merchants (especially in the western country). It is an important factor to be considered in the high cost of living. People like it but if they knew what it costs they would kick about paying for it."

"There is the text for a sermon in that last sentence," says the department, "especially if it be read with this from another answer:

"It costs us today 20 cents each to deliver packages, while before the war it cost us 5½ cents each."

But for the most part there was shown a reluctance to cut down service. Here are typical expressions along that line:

"We have not attempted to reduce our service in deliveries as we believe that service today more than ever before is going to be one of the strong factors in business reconstruction."

"We have made no reduction in service. I cannot see that our public is any less entitled to good service during a period of slack business than during a period of good business. As a matter of fact the present opportunity should afford right thinking concerns an opportunity to reestablish the service that suffered so much through the inefficiency and lack of interest of employees during the war."

Reduction in Credits.

More than 20 per cent. of those who answered had made a reduction in the volume of credit business. Some had shortened the time on charge accounts, while a considerable number, more than four per cent. of the whole, had lengthened time on this class of business. Some of the methods adopted are interesting:

"We are more lenient on credits based on normal standards than on financial."

"More liberal on small credits and small accounts than ever; to increase our sales and build up good will."

"Closer attention and sharper action taken with credit business. Cash business being promoted by quoting liberal discounts and boosting 'cash and carry' method through circulars and salesmen."

"We are charging interest on all accounts which run longer than the 11th of the month following date of purchase. This has reduced the monthly balances on our accounts approximately 25 per cent."

"No change in terms of payment of domestic accounts, but making more liberal terms of payment on export business to meet competition."

A general question as to what other means had been used to reduce costs drew forth a wide variety of replies. Stopping the little leaks has engaged as much of the business men's attention as reducing the heavier expenses. Budgets are getting much more careful attention. "Figuring out ahead what funds we will have available and planning our expenses accordingly," is the way one man puts it. Here are some other suggestions of ways along which the work of cost reducing has been carried on:

"We have adopted the method of thinking twice before making an expenditure, and have figured out what each store can spend each month and no more."

"Cutting out entertainment, travelling and other incidental expenses, scrutinizing telegrams, long distance messages, postage and creating short cut methods where possible."

"Eliminating some of the extravagant habits contracted during the period of hysteria." "This firm is putting in a complete cost accounting system and finding it a great factor in reducing costs." "Our costs are being reduced by a forced liquidation of merchandise based on replacement values."

WHIPPLE SALES MANAGER.

Fred G. Whipple, division sales manager for the Service Motor Truck Co., Wabash, Ind., has been appointed sales manager in California, Arizona and Nevada. Walter Dix, formerly of the Packard Motor Car Co., has been appointed to succeed Mr. Whipple in Maryland and Virginia and parts of Delaware and North Carolina.

U. S. MOTOR TRUCK DIVIDEND.

At a recent meeting of board of directors of the U. S. Motor Truck Co., Cincinnati, O., the regular 1¼ per cent. dividend of preferred stock was declared. This was payable April 10. The substantial basis on which this company is organized and operated has enabled the concern to take care of all dividends on the regular basis.

TRUCKS NEXT TO RAILROADS.

Statistics for 1920 show that motor trucks carried more tonnage than either inland waterways or interurban trolley lines. Motor transport now ranks second only to rail transportation.

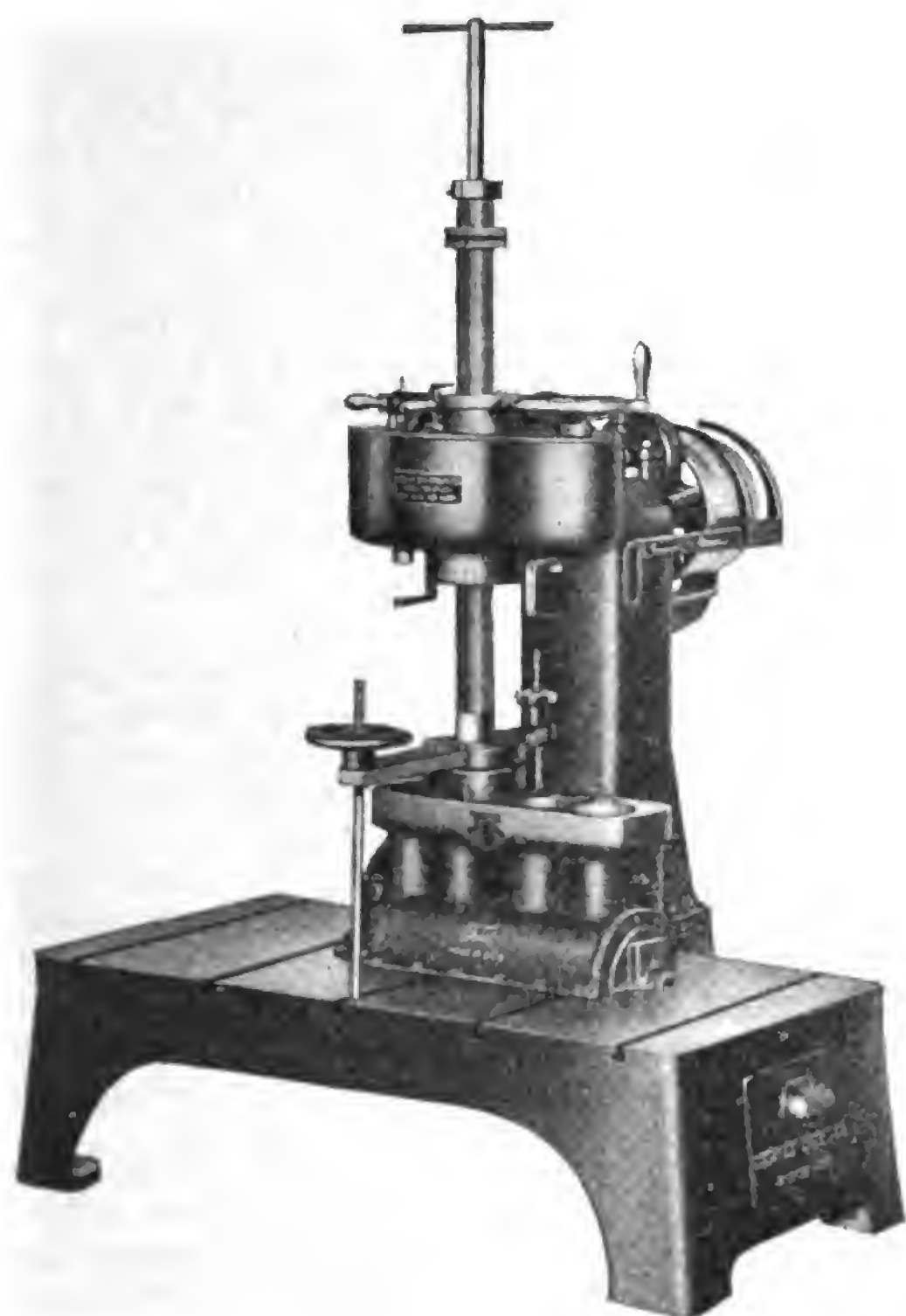
NEW ACME DISTRIBUTOR.

Acme trucks will hereafter be distributed in Western Michigan by the T. C. McGurrian Sales Agency, Inc., Grand Rapids, Mich.

Garage and Service Station Machinery Tools and Equipment

HINCKLEY-MYERS POWER CYLINDER REBORING MILL, NO. HM-7.

The Dearborn Equipment and Hinckley-Myers Co., 6 North Michigan boulevard, Chicago, Ill., announces that it is



now in production with its new power cylinder reboring machine, No. HM-7, which is the result of a large demand for a positively accurate cylinder reboring mill embodying all necessary features to produce a perfect cylinder wall. The company claims that the machine has an absolute centering device, which centers the work, a pilot bar through the cylinder, which guides the cutter, a micrometer adjustment for each separate cutter blade by which each blade is set accurately, an automatic device which stops the cutter at the end of its travel and that the machine is positively free from vibration or chatter. The machine is absolutely guaranteed against defective material and workmanship.

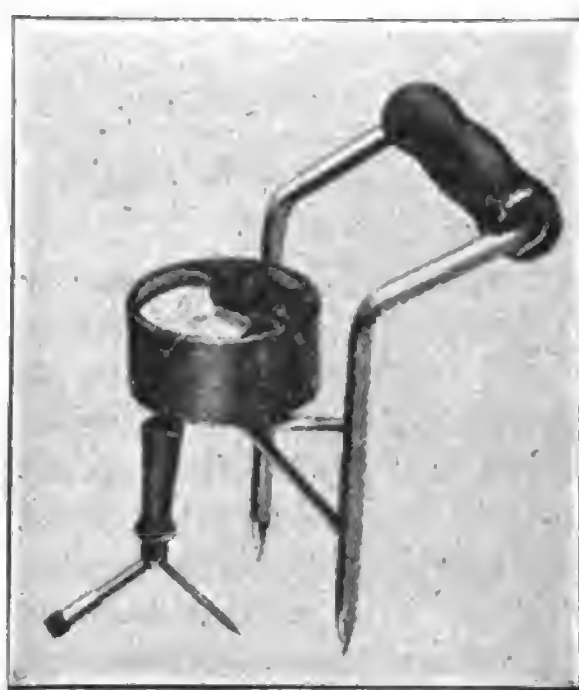
VESUVIUS BLOW TORCH.

The American Stove Co., St. Louis, Mo., manufactures a gasoline torch for the service station repairer which has met with many favorable comments. The torch is manufactured in pint and quart sizes, consisting of two lines. The one has a heavy seamless brass tank and the other a seamless steel tank, which is tinned after fabrication, protecting the steel in a very effective way from coming in contact with the fuel.

HYDRATE BATTERY ANYLIZER.

Recent experience has indicated the practicability of the Hydrate discharge method of testing motor truck batteries. In line with this now recognized practice the Service Station Supply Co., 30-

32 E. Larned street, Detroit, Mich., has placed upon the market an instrument known as the Hy-



date Battery Anylizer, which preserves the very excellent feature of making a high rate discharge through a patented chromel resistance, and combines with it the unique arrangement of a third terminal volt meter of an easy reading type. Attached to the third terminal of the meter, by means of a flexible lead, is a fork spike, as shown in the cut. One spike of the fork is the test point for voltage test and the other spike is the cadmium electrode for making cadmium test.

Full instructions accompany each outfit for testing the three elements required, high rate discharge, plain voltage and cadmium test.

THE F-J ADJUSTABLE REAMER.

The Foster-Johnson Reamer Co., 1092 Beardsley avenue, Elkhart, Ind., presents



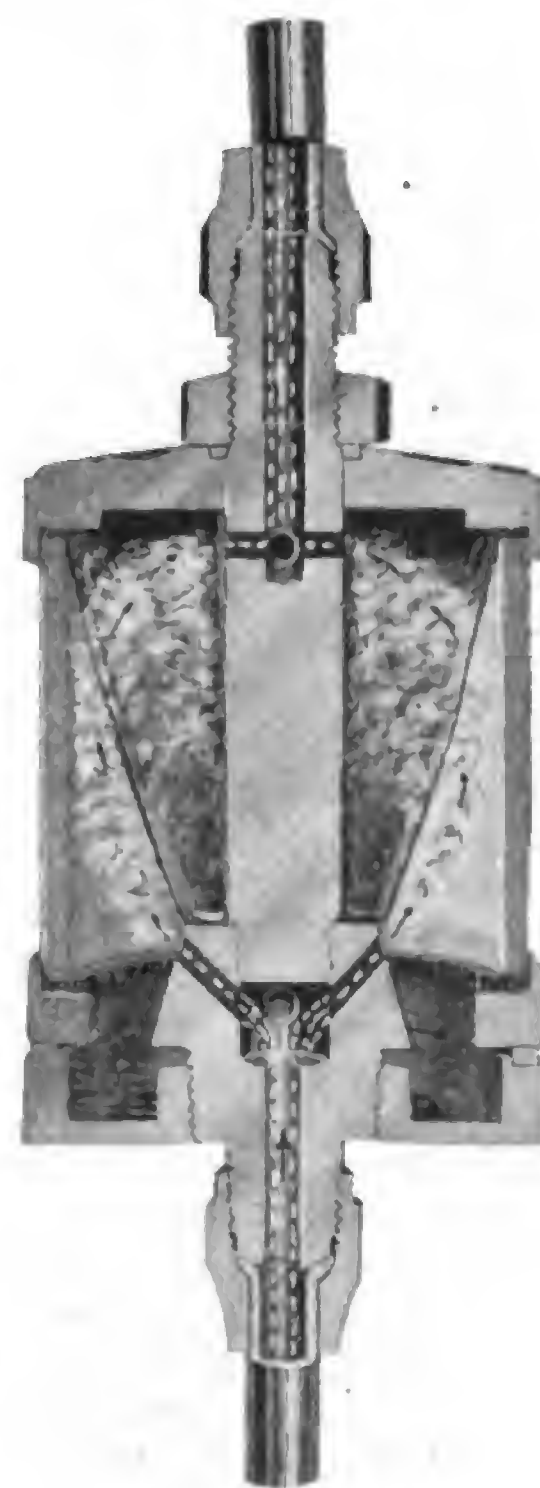
as one of the outstanding features of its adjustable reamer the ease with which it can be adjusted to any size within its range by simply turning the knurled head screw at the shank end of the reamer. The blades, which move in an absolutely parallel manner, can be expanded or contracted in the same way as a micrometer is adjusted. For sizing a hole this feature is invaluable.

The F-J reamer is stated to be a pioneer in that it introduces a new method of hand reaming. The reamer is contracted to a size slightly smaller than the hole, is inserted in the same and expanded gradually as the hole is reamed. By means of the graduations on the knurled screw the amount of the expansion can be read off very accurately.

RO-GAS-FILTER.

The Roll Manufacturing Co. Fond du Lac, Wis., is in production with a filter for the use of commercial vehicle engines that is claimed to positively separate all sediment and water from the gasoline. It is a small instrument made of brass fitted with a glass cylinder, inside of which is a chamolis filter held taut and in shape by a wire frame. The flow of gasoline is from the bottom, the refuse remaining below the cone shaped chamolis.

The filter may be attached at any convenient place on the gasoline feed line between the main tank and the carburetor. The device is easily attached in a few minutes time without the use of special tools and is adjustable to any make of engine using either gravity, vacuum or pressure feed.



FARMERS ARE BEST PROSPECTS IN MOTOR TRUCK SALES FIELD

HOW many motor truck dealers in viewing the admittedly depressed period of industry in general business and the consequent slowing up of truck sales, have overlooked the fact that the farmer's business is always good? Year in and year out, regardless of strikes, lockouts or downright bad business along other lines, the farmer has always his allotted work to do and receives his allotted remuneration. As a matter of fact this latter phase has assumed greater proportions since the war because of the fact that high priced labor that was attracted to the city during the period of high pay is now going back to the land at greatly reduced wages—all of which means that the farmer is perhaps the best class of prospect that the dealer has at this particular time.

But how many motor truck dealers are cashing in on the fact? There is no better time than right now for the dealer to get this business. The spring planting is done and the farmer is approaching the summer and fall season when his work will be at its highest point for the year. He should be all set to listen to irrefutable facts the dealer can present that cannot but interest him.

In the first place there is the saving of time that is assured by the motor truck. The farmer, because of the nature of his business, is located as a rule well beyond town or city limits. But he sells his product in the urban territory. This means that the speedy motor truck is an actual necessity to him as an aid in the distribution of his product. The team of horses, while it did well enough in the days when every farmer had the same equipment, does not quite fill the bill at the present time for the very good reason that other farmers who own trucks get the cream of the early market and do so without putting in as long a day as does the farmer who still depends on the horse drawn vehicle to get his goods to market.

This also does not take into consideration the difference in the load capacity of the two types of vehicle, which in itself is sufficient argument to warrant the use of the motor truck. In addition to this there are other factors that enter into the matter.

One of these is the comparative expense of operating the horse drawn vehicle and the power hauler. This is not the relative expense which, figured from the basis of accomplishment, is obviously in favor of the truck, but is a comparison of the actual mile cost of the horse drawn vehicle and the commercial car. A short resume of the actual facts will show that the motor truck costs less to operate than does the horse drawn conveyance. The average farm horse—and these figures are authentic—works

There are approximately 6,500,000 farmers in the United States. Only 100,000 of them own motor trucks. Why isn't the percentage greater? It isn't lack of ready money that keeps them from buying the commercial vehicle, because the farmer class is the largest buyer of passenger automobiles in this country. This fact is proven by the present registration figures, which show that there are more than 3,000,000 cars that are farm owned.

The above figures then, mean that nearly 40 per cent. of all the automobiles in use are owned by farmers, whereas less than 10 per cent. of the trucks in use are owned by them. There's something wrong somewhere and a careful review of the subject leads one to believe that these farm prospects have not been gone after in the right way. Is this the correct answer?

90 days a year. To do this 90 days' work he must be fed nearly 1100 times.

This means that for each day's work he accomplishes the horse eats 13 meals. They are expensive meals at this particular time, too, as he who pays the grain and hay bills will testify. It would be interesting to print actual figures in this connection, but inasmuch as the circulation of this magazine covers a large part of the United States and hay and grain prices differ materially in different territories, it is not thought best to go into such specific detail, especially since the abstract facts strikingly indicate that the horse is all together too expensive to give efficient service, especially when one adds the expense of shoeing, the cost of upkeep of wagons and harnesses, and the time spent in caring for the animal.

One truck will easily do the work of several horses but, for the purpose of fair-minded argument, let us compare the truck expense with that of a single team of horses. Even then the advantage is wholly in favor of the motor vehicle and this fact is so evident as to make it a mere waste of time to go further into this phase of the matter.

There is still another way in which the motor truck saves time and money and that is by making the entire working day a productive day. For instance, suppose the farmer who depends wholly on horses for haulage gets up early in the morning to start his day's work. He first goes to the barn, feeds his animals and cleans the stalls. Following this he must water the horses and then clean them off, after which he harnesses them and backs them alongside the pole, finally hitching them up to his satisfaction. He then drives to the field or perhaps the cellar, depending on where he is to get his load, fills his wagon and starts for town.

As the horses are straining along, usually at a snail's pace, with the heavy load, he hears a clanking noise and the off horse casts a shoe. This means that he must drive past the blacksmith's shop. Arrived there he finds that his turn comes in about an hour, and if he has good luck he gets started out on the road again in an hour and three-quarters from the time he landed at the shop.

We will suppose that he gets his load landed at its destination and starts back

with another load. He arrives at the house early in the evening, stows away his load, unharnesses the horses and feeds them. He then eats his supper and later in the evening goes out to the stable to water the animals and bed them down for the night. This means that he has put in a long day of work, but because of the time spent in caring for the horses and the slow travel over the road, the day has not been wholly productive by any means. Then add to

this the fact that he frequently does not like to use the horses for a similar day's work the following day. He may have work that should be attended to in the city but, if the previous day has been warm, he is frequently compelled against his wishes to leave the team in the stable.

And now look at the farmer who does his hauling with a motor truck. He arises an hour later than the man who uses horses. He gets his breakfast and then goes to the barn or wherever he keeps the truck. Setting his throttle and spark at the proper point, he nonchalantly strolls to the front of the machine, gives the crank a twist, and climbs aboard the car. He gets his load on in a few minutes and inside of an hour has landed it at its destination in the city. This done he picks up his return load and starts for home, arriving there before lunch. Suppose the day has been hot. That doesn't make the slightest difference to the truck. It is ready for use 24 hours of the day.

It effectively does away with non-productive hours, and there is no time wasted in feeding, watering and general work as with the horse. Every working hour is a productive hour with the motor truck, and the live dealer will stress this point in calling on his farmer prospects.

It is true that truck sales have been slow in the agricultural territory. Just why this fact obtains is a matter for conjecture for certainly there is no class of owner that could find greater or more efficient use for the motor hauler than the farmer.

The different bulletins published by the United States Department of Agriculture overwhelmingly prove from actual contact with the farmer that he is more than satisfied that the motor truck greatly reduces farm work, and can be operated at a low proportionate cost, but the fact remains that there are more than 3,000,000 automobiles owned on farms whereas there are less than 100,000 farm owned motor trucks. And there are 6,500,000 farms in these United States!

Is it the dealer's fault that this condition exists? Apparently it is if the foregoing facts can be used as a basis of judging. The farmer is ready for the truck. He may have been somewhat

sceptical in the past, but there is every evidence to believe that he has now made up his mind to purchase one. The annual appropriation for good roads amounts to more than a billion dollars this year. This means that even in the most isolated district the highways will be suitable for the operation of the motor truck. It also means that many farmers will be engaged in the work of building these roads during their slack season and will be prospects for the sale of a truck to use in this work.

Why wouldn't it be a good plan for the dealer to arrange a tour of the farming community in his territory? This could be done by having a regular "field day," at which a number of distributors could get together and demonstrate their machines to all who cared to see them. Lunch could be provided and the event could be run off somewhat in the manner of an athletic meet, though of course being non-competitive. This proposition would call for a certain amount of advertising and invitations could be sent direct to each farmer and his family.

The writer is given to understand that a similar event was staged in a western state that resulted in the direct sale of 24 trucks that were signed for by farmers who attended the meeting, and the impetus gained resulted indirectly in the sale of many more machines.

Another way that has proven satisfactory in practise is that of having a "tour." For instance, a dealer will start a salesman out into his suburban territory with a truck. Prior to actually starting on the trip he will have mailed letters to the different farmers similar to the following:

Dear Sir:—

I take great pleasure in having my salesman call at your home on (insert date) to give you a thorough, practical insight into the adaptability of the truck to handle a large proportion of your farm work. "Actions speak louder than words," and I believe that you will be agreeably surprised at what this machine will have to say for itself. Remember—this demonstration is made wholly at the writer's solicitation and you are not putting yourself under obligation of any sort in accepting it. The work is purely educational and we shall be just as good friends if you don't buy as we will if you do.

Sincerely Yours,

These letters should not be form letters, but should be typewritten to each individual in order to convey the impression that the demonstration is aimed directly at the prospect, and the salesman should be sure that he knows each prospect's name before calling on him. The main idea is to make it look as though the dealer was concerned with the individual farmer rather than farm owners as a whole, and for this reason it is not wise to make a public announcement of the demonstration in advance.

This method of selling trucks in agricultural territories is proving productive and has materially demonstrated the value of individual effort in dealing with the farmer. The dealer who plans to actually sell motor vehicles to the farm owner or country store keeper should start in to do business right off. He

can gain nothing by waiting, and, incidentally it may be said that many dealers have realized this fact and are already doing a fine business with this class of trade.

Regardless of whether the farmer is hard to sell to or not, he certainly should be using more motor trucks than he is. This is apparent when one thinks of those figures again: 6,500,000 farmers as prospective purchasers and only 100,000 trucks sold to date. Let's get a share of that business and get it this summer. It's worth while.

COMPANY FORMED TO SELL SLOUGH TRUCKS IN UNITED STATES

The Truck Co. of America has been organized in New York city by L. Mansbach of the Fidelity Motor Supply Co., I. Edward Roskam of the Roskam-Scott Co. and A. B. Messing of New York, and Morris Froelich of Chicago, to deal in American made motor trucks which will be reimported from England. It is understood the new company has purchased approximately 3000 of these trucks from the Slough Trading Co., Ltd., of London, which bought them from the British government. Two thousand of the trucks are now in this country.

The trucks, it is stated, will be sold at approximately 50 per cent. of the list price. Among the makes included in the purchase are Pierce, Mack, Packard, White, Riker, Locomobile, Liberty, Peerless, F. W. D., Nash and E. M. C. In addition to the trucks the company proposes to import a large quantity of parts for replacement purposes and also accessories of American make.

The company proposes to offer dealer franchises throughout the country and to advertise extensively.

Mr. Roskam has been the New York representative of the Slough Trading Co. since it began reimportation of these trucks into the United States. The first large shipment was sent to the Pacific coast, but the demand for them was not heavy. It is now believed that with general business conditions approaching a more normal basis there will be an increased demand for these trucks.

The company has leased a building with 45,000 square feet of floor space on the ground floor in 56th street between 10th and 11th avenues, as well as a warehouse with 35,000 feet of space and a three-story office building in West 63rd street.

It is stated that the company will have an export department with representatives in various foreign countries to offer foreign buyers trucks in large quantities. An especial effort will be made in this country to develop business with road builders.

DRAYMEN'S ASSOCIATION WANTS SERVICE STATIONS.

The Southern California division of the Draymen's association has adopted resolutions requesting manufacturers of complete unit parts to establish parts sta-

tions at which genuine parts can be purchased at fair and uniform prices for the units now being manufactured as well as those which are considered obsolete. This method, the resolution asserts, is the only practical way in which motor truck users can get the service to which they are entitled.

The assertion is made that past experience demonstrates that distributors and agents either cannot or will not carry a complete stock of parts. Another difficulty, it is stated, is that manufacturers are constantly changing their representatives as well as their models and that as a consequence members of the association constantly are finding themselves with broken down equipment because no one carries the parts needed.

NASH ADDS HIGHWAY CONSTRUCTION MODEL.

The Nash Motors Co., Kenosha, Wis., is bringing out a 2½-ton truck which is especially adapted to highway construction work. Its general specifications are much the same as the present two-ton model, 3018, except that the springing has been made heavier, the wheelbase shorter and some other minor changes have been made to allow for the heavier loads. The price, f. o. b. factory will be the same as the 3018, \$2550. The wheelbase is 121 inches and the space back of the driver's seat about 97 inches, this of course depending on the style of body used. Pneumatic tires may be fitted.

FUEL PRICE REDUCTION WILL HELP BUSINESS.

The recent price reduction on the part of the oil companies is hailed in motor circles as a basic move in reconstruction which will permit lower costs of doing business. With 60 per cent. of the total gasoline consumed used for business purposes, it is pointed out that fuel prices have a direct bearing on the cost of doing business. With refineries closing down for lack of business it is regarded as a certainty that lower prices will continue to reign indefinitely in the gasoline field.

BLAKE IS SERVICE ENGINEER OF TRANSPORT CO.

E. A. Blake has been appointed service engineer of the Transport Truck Co., Mt. Pleasant, Mich. Before joining Transport he was assistant superintendent of the Republic Truck Sales Corporation's engine division at Alma, Mich. He has also been in the engine department of Curtiss Aeroplane Co., Inc., and before that was with Maxwell and Standard.

NEW LIGHT DELIVERY TRUCK.

The Elmira Commercial Motor Car Co., Inc., Elmira, N. Y., is soon to be in production on a light delivery truck, for which unusual economy of operation is claimed. Experiments are now being conducted and the new vehicle will be on the market at an early day. It is intended primarily for the use of the smaller retail merchant.

GAMMON SIDE-DUMP CONSTRUCTION BODY

THE Pechstein Iron Works, Keokuk, Ia., is now in production with a new type of side dump body which has been developed from the original idea of a contractor. The early bodies built proved that the principle was correct and that it would not only reduce the labor cost and handle the material more quickly but that the body also delivered the material to the mixer clean and reduced the loss of material to practically nothing.

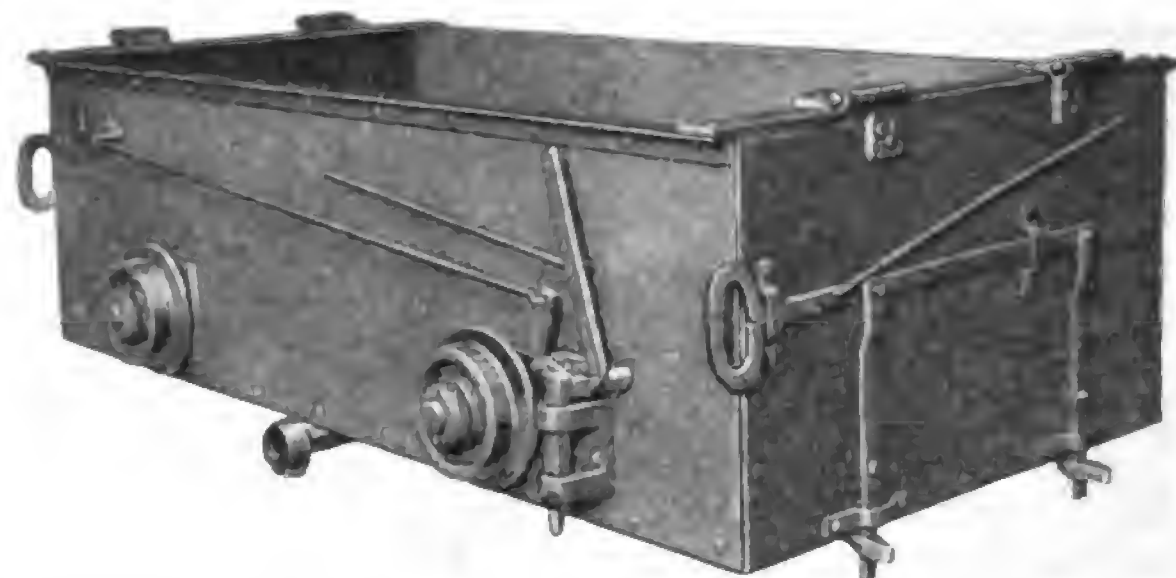
Realizing the wonderful saving this method had made, it was decided to place the body on the market. Arrangements were made with the Pechstein Iron Works and with the assistance of the company engineers improvements were made in the design which seem to prove that the Gammon side dump body is the most economical method of handling bulk material.

The chief feature of the Gammon side dump body and one that instantly appeals to road contractors, is that the truck with its load is driven alongside of the mixer and the load from the side dump body emptied directly into the mixer pan without additional shoveling. This feature eliminates several men besides delivering the load without loss of material and in as clean a condition as when unloaded from the cars.

Two bodies are mounted on a chassis, a special steel mounting being supplied by the manufacturer, which is fastened to the frame of the truck and supports the bodies and also provides guide rails on which the body runs when dumping the loads. End gates and fastening devices are fitted at each end of the steel

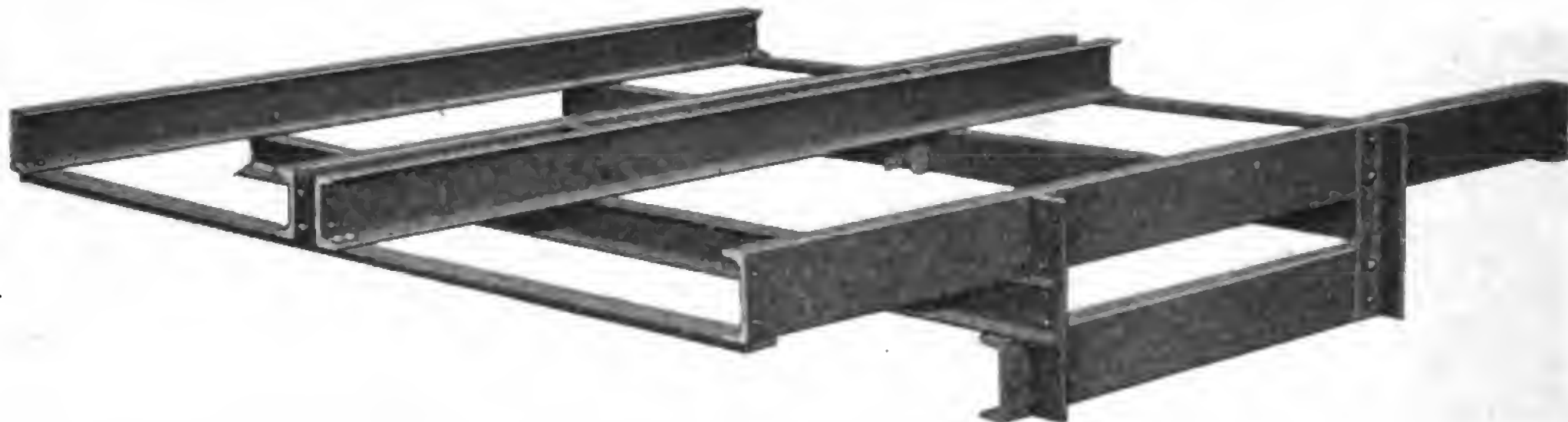
dumping body, enabling the operator to dump the load of the body on either side, which is a decided advantage, and allows operator to place the loads both on the same side or alternately as desired. Steel flanged wheels attached to the sides of the body, two on each side, fit the steel rails of the frame mounting, while a guide roll attached to a cross shaft is fitted under the body and prevents the body from leaving the rails when dumping flanged wheels operating on steel rails facilitate dumping, enabling operator to dump the load easily and return the body to a horizontal position without assistance.

All corners and joints of the sub-mounting are riveted together solidly with hot rivets, making a structure which will stand hard usage without



Gammon All-Steel Side Dump Body, Showing Type of End Gate and Rollers Which Facilitate Dumping Loaded Body.

inside dimensions are: 60 inches long, 30 inches wide and 18 inches deep. Overall dimensions: 66 inches long, 40 inches wide, 21 inches deep, and weight, 390 pounds. The sides are 10-gauge blue annealed steel sheets, braced with angle irons and securely riveted. The axles are of steel, and the rollers are of cast iron, while the door latches are of forged



Steel Channels on Which Gammon Side Dump Bodies Rest, Equalizing Load on Chassis Frame.

loosening. The corners and joints of the body are also hot riveted, while the side members and frame are of high grade steel.

The capacity of the body is .7 of one yard, or .75 of a yard heaped up. The

steel.

Gammon End Dump Body.

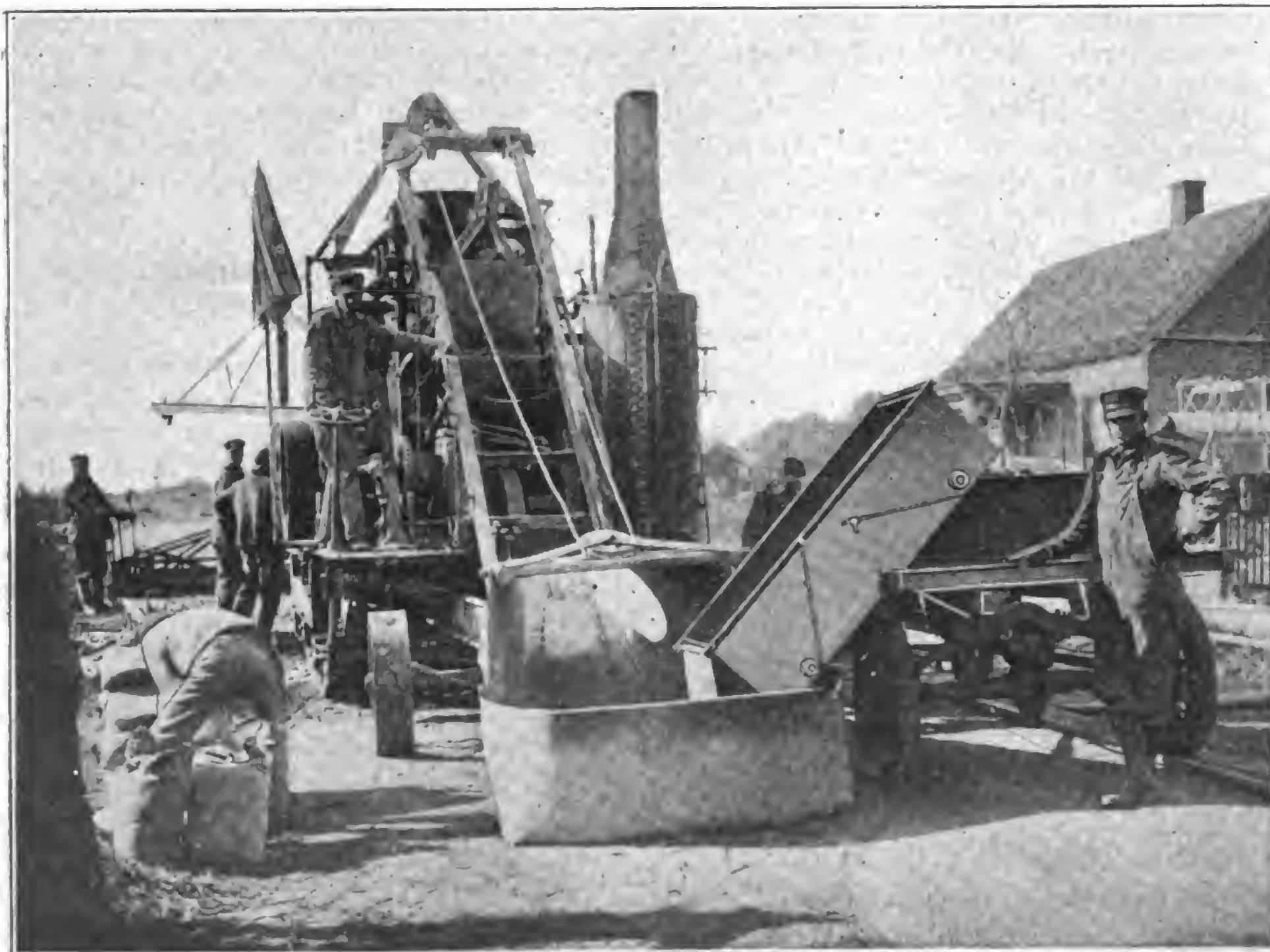
Gammon dump bodies are also made in a larger size, which is used singly on the Ford one-ton chassis. This body is of the rear dump type and is built in two sizes, three-quarter yard and one yard capacity. The dumping angle permits the material to slide out clean from the box. The closeness of the box to the ground when in dumping position, and the manner in which the door is hinged, prevents the material from splashing over the sub-grade, concentrating the material in a pile.

When the Gammon rear dump body is loaded and in hauling position, the load is carried by the entire frame and, similar to the side dump, is distributed well over the whole chassis. The designer's idea is to relieve the frame strains caused by loads being concentrated in one place.

FALLAM A MACK MAN.

Rodney Fallam has been named manager of the International Motor Co.'s direct factory branch for the Cincinnati territory. He was formerly New York manager for the Garford Motor Truck Co.

The Bennett-Sustrich Co. has taken over the plant of the Southwick-Pom Co., which has been manufacturing motor truck bodies at 472-480 West Boulevard avenue, Detroit, and will continue to do business at that address.



Driving Alongside Mixer Allows Truck Fitted with Gammon Side Dump Body to Dump Aggregate Directly Into Mixer Without Waste or Loss of Material.

REMY HIGH TENSION MAGNETO, SERIES 1500

MORE than 20 years have passed since the first Remy magneto was produced and since that time there is hardly a page in the history of the automotive industry on which the name of Remy does not appear. In the days when the speed car was holding the world's attention, many of the fastest records were established by Remy equipped cars.

During the rapid progress of the industry, Remy has always been found at the front and, as the adoption of complete electrical equipment for automobiles became general, Remy systems were found as standard equipment on a large part of America's automobile production, and a high-tension magneto of a quality in keeping with the Remy standard is now offered to the trade.

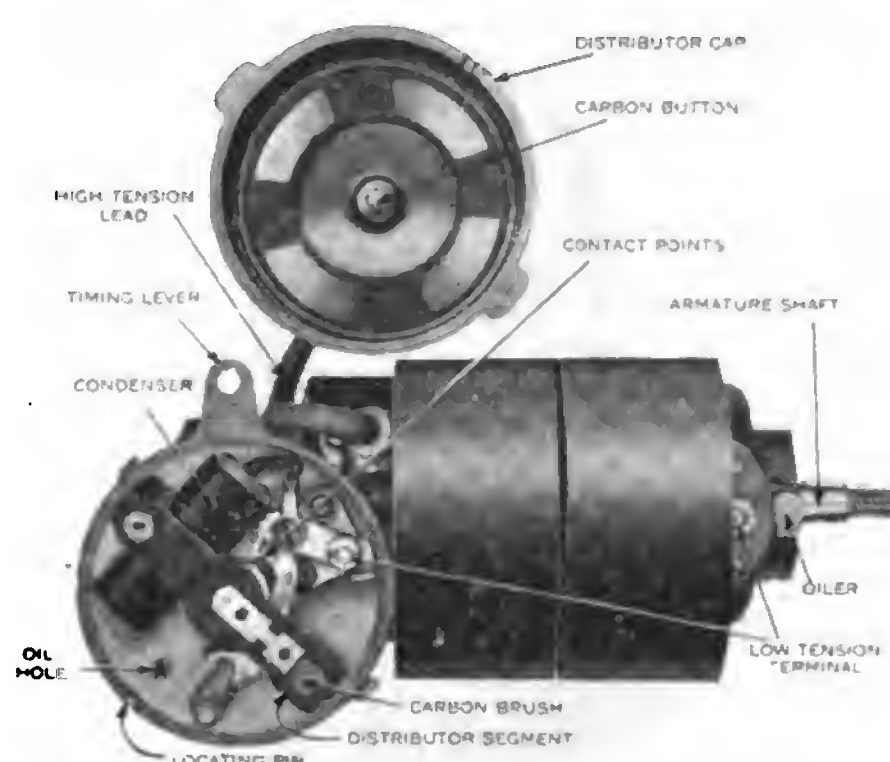
In the building of this instrument Remy has made use of the experience gained in the manufacture of several millions of units of ignition and other electrical apparatus. Production methods and skilled workmen developed through a period of many years have been available and all these factors have been combined to make the new high-tension magneto an instrument worthy of its place among other Remy products.

It embodies all of the best features of design which have been thoroughly tried out, combined with certain new and valuable features instantly recognized as a marked step forward.

Accessibility of Distributor and Impulse Starter.

Among the most important features of design are the vertical distributor mounting and the compact impulse starter coupling. Recognizing the desirability of having the circuit breaker and distributor in the most accessible position possible, Remy placed these units vertically at the rear end of the magneto in such a position that the entire mechanism of these parts is open for inspection when the distributor cap is removed. The circuit breaker cam and distributor rotor are mounted on a vertical shaft driven by hardened spiral gears, which run in heavy grease in a dust proof housing around the end of the armature shaft.

The Remy impulse starter coupling is simple, compact and sturdy. Its very simplicity and small number of parts insure reliable and efficient operation. By means of this impulse coupling a spark equivalent to the maximum output of the magneto is delivered at the correct in-



Remy Magneto Disassembled, Units Indicated.

stant for firing when the engine is hand cranked. As soon as the engine starts the impulse automatically ceases to operate. This occurs at a speed which is slightly lower than an engine can be idled, thus insuring no irregularity of firing. A steel case completely encloses all parts of this impulser. One portion of this case is a pressed steel shell fixed to the magneto end bearing on the top of which is a timing mark. Another mark is stamped on the moving portion of the case and the magneto should be timed with the engine by rotating the moving shell backwards until the two marks coincide. No attention need be given to the magneto breaker points and the firing position of the engine with the spark control at full retard will be eight degrees in advance of the firing position when the impulse starter is operating. Regardless of what position the spark control may be in, the engine, when cranked, can fire only at the predetermined position, thereby eliminating all danger from back firing.

Wiring Diagram New 1500 Series Remy Magneto.

The circuit diagram clearly shows how short and direct both primary and secondary circuits are and how accessible are all parts of those circuits. The inner end of the primary winding is grounded to the core and from this point the current flows through the primary wire to a collector ring which is of copper and insulated from the armature head. Here it is picked up by a brush, carried by means of a copper pig tail to the primary brush holder terminal, from which it passes through an insulated cable to the circuit breaker, condenser and ground. Immediately under the primary brush holder is a brass plate grounded to the magneto frame, to which is connected a collector brush which makes contact with the bronze head of the armature and by means of which the ground circuit is completed.

The secondary or high-tension circuit is through the secondary winding, which consists of a great many turns of fine copper wire to the high-tension collector ring. This collector ring is of bronze moulded between two flanges of hard rubber and the current is picked up from this ring by a carbon brush in the high-tension brush holder.

From the brush holder the current goes direct through a heavily insulated cable to the center terminal on the distributor cap. From there it is distributed by the rotor under the cap by means of a wipe contact to the segments. The distributor cap is of moulded material with a hard rubber track over which the distributor brush travels.

ARMLEDER TRUCKS MAKE LONG OVERLAND TRIP.

After a two weeks' trip of 1435 miles, five Armlader motor trucks have arrived in Denver, Col., having been sent overland to the Leyner Tractor Co., at Denver, newly appointed distributors for that district. The average mileage was 100 a day. Three of the trucks were driven and hauled the two lighter ones.

DELAWARE COMMERCE SALES.

The Commerce Delaware Truck Co. has been formed at Wilmington, Del., and has taken over the Delaware distribution of Commerce trucks. Thomas Wright is president of the company.

SERVICE CANADIAN PLANT.

The Service Motor Truck Co., Wabash, Ind., appears to be going merrily forward in its plans for a new \$5,000,000 plant at London, Ont. Officials of the company recently visited London in connection with this project.

'BUSES GO BIG IN DETROIT.

The Detroit Motorbus Co. plans to add 10 'buses to its equipment immediately. The company started with eight in June and now has 27 in operation.

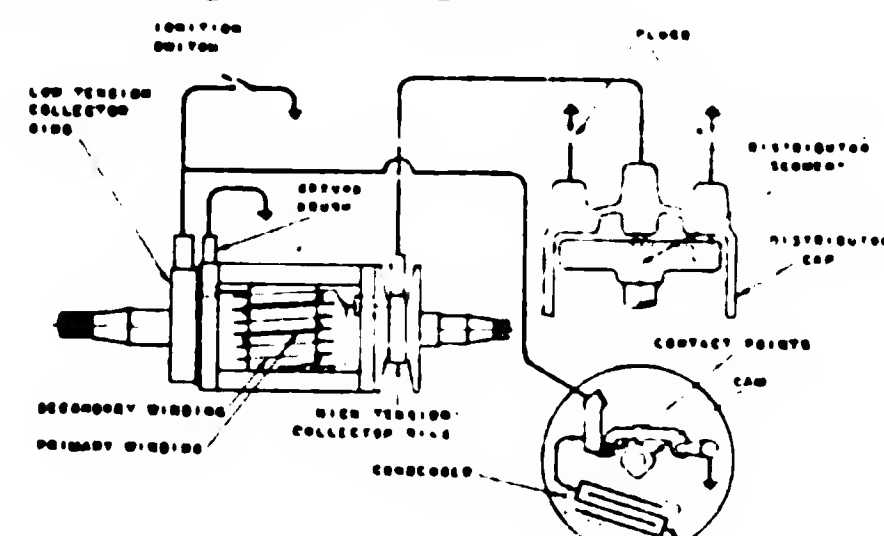
VIM DIVISION MANAGER.

The Vim Motor Truck Co., Philadelphia, has appointed A. N. Lyon as division manager, his territory taking in Kentucky and Tennessee.

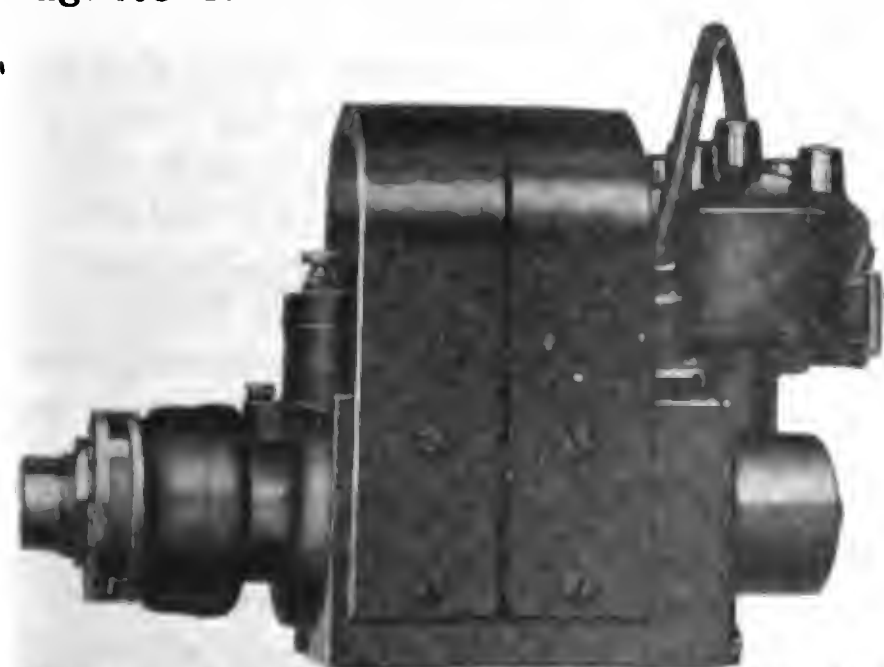
TRUCK OWNERS TO MEET.

The National Team and Motor Truck Owners' association will meet in annual convention at Detroit, Mich., in June.

It is stated that a ton of straw will yield 40 gallons of gasoline.



Wiring Diagram New Remy Magneto, Series 1500.



Complete Remy Magneto, Impulse Starter Located on Drive Shaft.

CONVERTS GASOLINE INTO TRUE GAS

THE Swartz Electric Co. of Indianapolis, Ind., whose factory is located at the Speedway, announces the development of a new device called the Swartz Gasser, and which is intended to be placed on the market in a short time. The Swartz Gasser is an automatic mechanical device for converting gasoline into a true gas, instead of a mixture of air and finely subdivided particles of the fluid held in suspension, such as is commonly used as the fuel supply of ordinary internal combustion engines, and it is stated that some exceedingly broad and fundamental claims have been filed in the United States patent office covering the process.

Attention is drawn to the fact that carburetors, of which there are scores of types in everyday use, are all made on practically the same principle, the aim being to secure as perfect a "mixture" of gasoline and air as is possible. Differences in details of constructions are devoted to improved methods of insuring such a mixture and also to the control of the proper proportions of gasoline and air supply. The Swartz Gasser is claimed to be an entire departure from the carburetor principle. Instead of the cylinder of the engine being fed with a more or less rich mixture through the carburetor, the Gasser supplies it with real gas which, when combined with the proper proportions of air forms an explosive compound which tests show develops about 100 per cent. more power a gallon of gasoline consumed than is obtainable by the best of the present methods. It is well known that gasoline under normal conditions is very volatile and gives off an inflammable explosive gas. But because of the fact that only a portion of the gasoline could be volatilized, the remainder, being too heavy, accumulated and as a constant supply of fresh gasoline was added it causes such an accumulation of this residuum that it has to be drained off or otherwise disposed of at frequent intervals.

Construction and Operation of Swartz Gasser.

The Swartz Gasser is claimed to be the first successful attempt to utilize both the volatile and heavier constituents concurrently. It is a metal gasoline reservoir connected with the main gasoline tank by an ordinary feed pipe with a float control of the usual construction. The top of the reservoir forms a gas dome which opens into the intake manifold with an improved automatic auxiliary air intake.

As the piston falls on the intake stroke it draws this gas from the dome into the cylinder. At the same time it draws through a needle valve from the bottom of the reservoir a small amount of the heavier and less volatile fluid, which goes over with the gas and is exploded with it in the cylinder. By a simple adjustment the proportion of volatile and non-volatile materials is adjusted so that the varying grades of gasoline can



Ira T. Swartz, President of Swartz Electric Co., Indianapolis, Ind.

be used without the possibility of the accumulation of residuum. As the gas is drawn from the dome by the action of the piston head there is a vacuum created above the surface of the gasoline and this vacuum is replaced with hot air from an exhaust manifold air heater, which surges into and through the gasoline reservoir from beneath and, by means of heat and violent agitation, accelerates the formation of the gas in the dome.

Three Fundamental Principles.

There are three fundamental principles involved in the operation of the Swartz Gasser that are distinctive and unique.

First—Putting the gasoline under a vacuum instead of atmospheric pressure accelerates the evolution of the gas.

Second—Relieving of this vacuum by means of a current of hot air passing through the gasoline not only heats, but violently agitates the gasoline and this in turn increases the evolution of the gas.

Third—The residue which would, under ordinary conditions, rapidly accumulate is carried away as rapidly as it collects by means of the needle valve. In fact, there is no residuum at any time, because it is used concurrently with the gas evolved from the surface of the gasoline.

The final perfection of the Swartz Gasser is stated to be the result of years of work in the experimental laboratory of the Swartz Electric Co. under the personal direction of Ira T. Swartz, the president of the company, and A. E. Weaver, experimental engineer. Its future possibilities can only be surmised, inasmuch as it is applicable not only to automobile engines, but also to all styles of stationary internal combustion engines, to submarine and aeroplane use, and to the production of an economical source of gas for domestic heating, lighting and cooking. Many exhaustive tests in actual use on automobiles and stationary engines have shown an average of double the economy from a given amount of fuel consumed. An automobile which would make 10 miles on a gallon of gasoline under the ordinary

method will, it is claimed, average 20 with the Swartz Gasser.

One of the Chief Difficulties.

One of the chief difficulties said to have been encountered in the perfection of the device was that the gas was so powerful and explosive that it was difficult to obtain proper control of it. One enthusiast remarked that there was as much difference between the explosive power of Swartz gas and that of the ordinary gasoline mixture as between exploding dynamite and burning wood. Swartz gas explodes, while a gasoline mixture simply burns rapidly.

HIGHLAND BODY MANUFACTURING CO. TO DISTRIBUTE ON NEW PLAN

The Highland Body Manufacturing Co. of Cincinnati, O., realizing the importance of getting the price of all motor truck equipment down to bed rock, at the same time improving the design and quality wherever possible, have redesigned the Highland line of standard bodies and cabs so that shipment can be made knocked down, taking advantage of the lowest possible freight rates.

In order to do this and at the same time place no additional burden on the truck manufacturer or dealer, they have established branches in Detroit and Chicago; the first having been in operation for two years at Greenwood and Holden avenues, and the Chicago branch having just been opened at Cottage Grove and Calumet avenue.

J. R. Carr, until recently connected with the Acason Motor Truck Co., will be branch manager at Detroit, succeeding Mr. P. H. Willis, who, since his discharge from the army, has been in charge of the Detroit branch, will go to Chicago and open up the new branch at Cottage Grove and Calumet avenues, taking possession May 1.

At other large centers, wholesale distributors are carrying this line, their distributors, like the factory branches, receiving shipments in car loads and having plant and equipment to readily mount bodies and cabs on chassis.

These truck equipment stations represent the latest move for efficient servicing the truck dealer. The chassis is delivered to the equipment station as it is received from the manufacturer and such equipment as Highland closed cabs, bodies and hoists, special tires and wheels, are mounted and the truck leaves the equipment station ready for the road.

By this efficient system of distribution there is no lost motion or unearned commissions between the manufacturer and user.

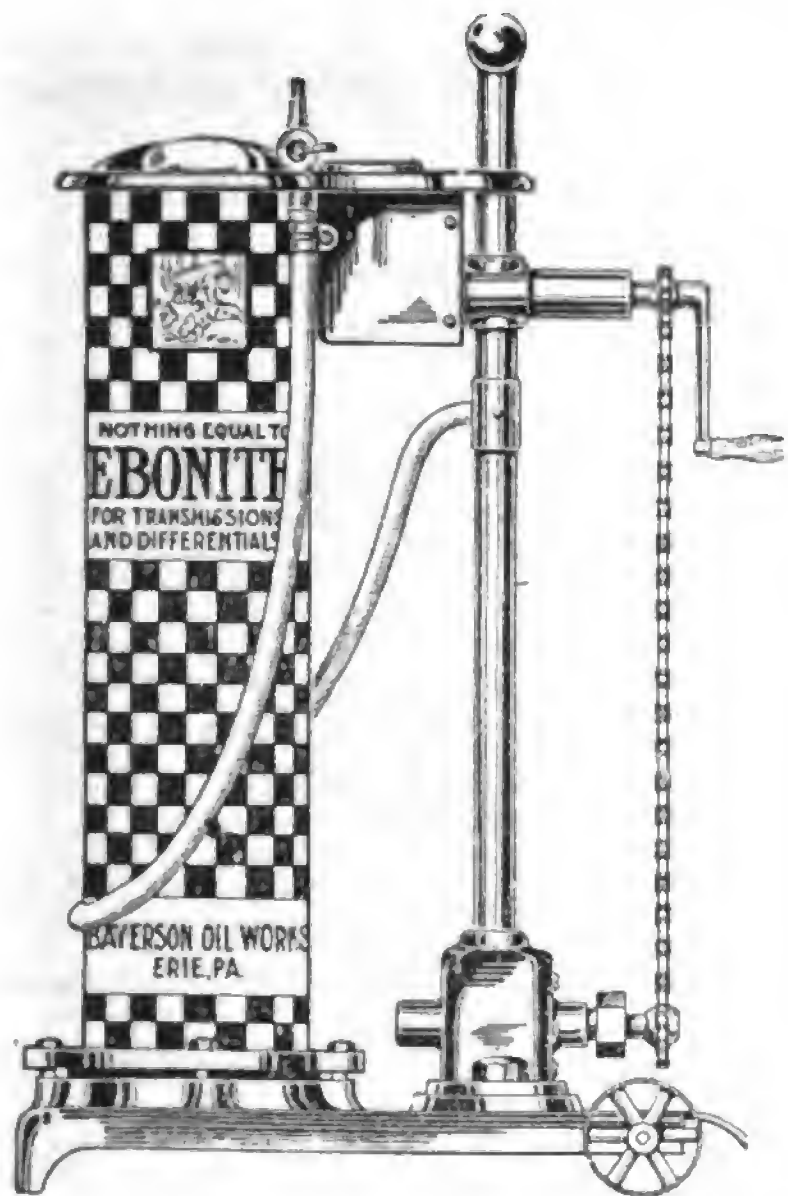
Descriptive matter of the latest design of Highland cabs and bodies is now ready for distribution either in the form of catalogues or loose leaf data sheets for the motor truck salesman.

New Motor Truck Accessories

CABINET FOR EBONITE TRANSMISSION GREASE.

The Bayerson Oil Works, Erie, Pa., is manufacturing and distributing with its Ebonite grease products, an efficient and practical cabinet or pump for the filling of differential and transmission cases with fresh lubricant. This cabinet, which has the reservoir lithographed on heavy iron in the Bayerson black and white checkerboard trade mark design, has a striking effect and calls attention to Ebonite products.

The base of the cabinet is heavy cast iron equipped with two large, strong



wheels, which serve for rapid and easy conveyance to any part of the service or fleet station by simply inclining the cabinet and using the wheels as those of a truck. The measuring device is extremely simple and accurate and is so placed that adjustment can be made almost instantly if any adjustment is required. The cabinet is equipped with a gear pump, which removes the menace of mechanical disorder and interruption in operation. There is no leakage and the operator need not muss hands or clothing, and what was usually conceded to be about the dirtiest job about a garage can now be performed with this cabinet in a clean and rapid manner.

ONAN SPRING SPREADER.

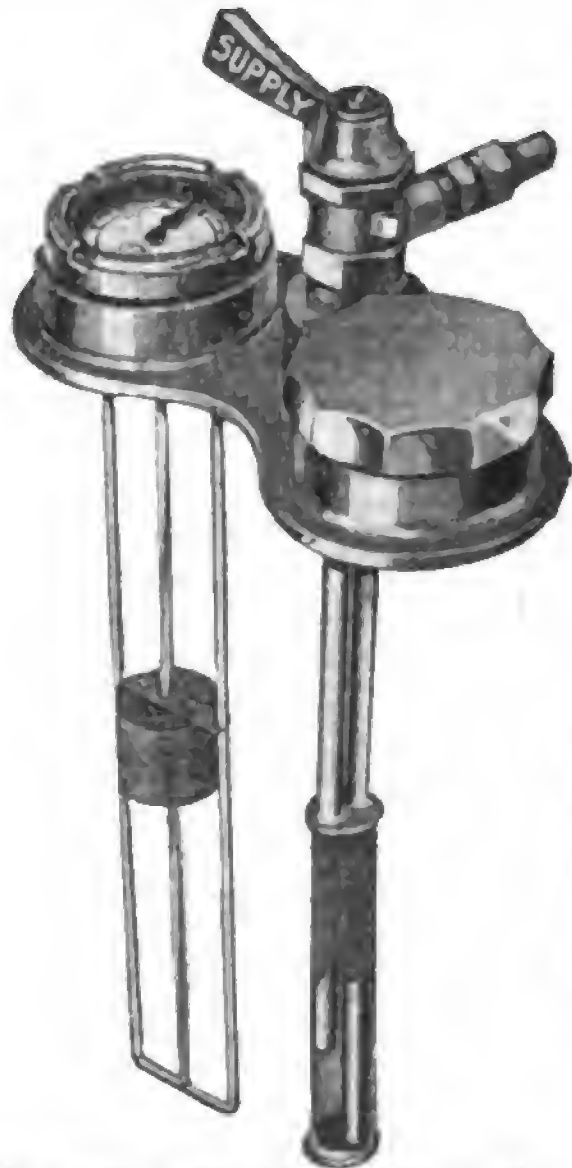
The Rosier-Howard Corporation, Hutchinson, Kan., is exclusive distributors for the Onan spring spreader, a unique device which is operated by hand and opens the spring leaves about $\frac{3}{8}$ inch, al-



lowing sufficient room to insert graphite or lubricating oil between the leaves. By using this tool, it is stated that it is possible for a small boy to quickly and easily lubricate all of the leaves in the springs in a car in a few minutes time without soiling the hands or clothes.

IDEAL RESERVE VALVE AND FILLER NECK.

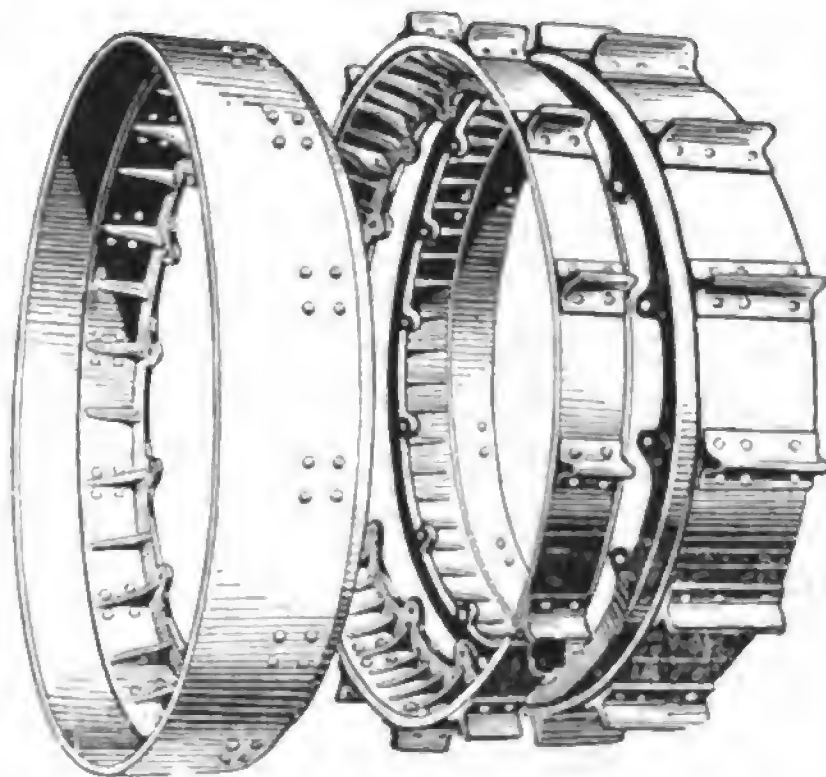
The Ideal Brass Works, Indianapolis, Ind., manufactures a new device to be used with vacuum fuel feed systems which is made in one piece, is inserted in the top of the main fuel tank and indicates the amount of fuel in the tank by means of a float, while a screw cap at one side allows for filling. A reserve



fuel valve is also fitted to the device, which allows fuel to flow through a short tube in the tank as shown until the supply from this source is exhausted. Turning the valve opens a passage into a longer tube which feeds the fuel system with a reserve supply of gasoline sufficient to operate the engine till a gasoline station is reached.

FOLEY TRACTION RIMS.

The Foley Traction Rim Co., Inc., 1311 Hennepin avenue, Minneapolis, Minn.,



manufactures traction rims of many forms and sizes for use on motor trucks to obtain additional traction while passing over soft or plowed ground.

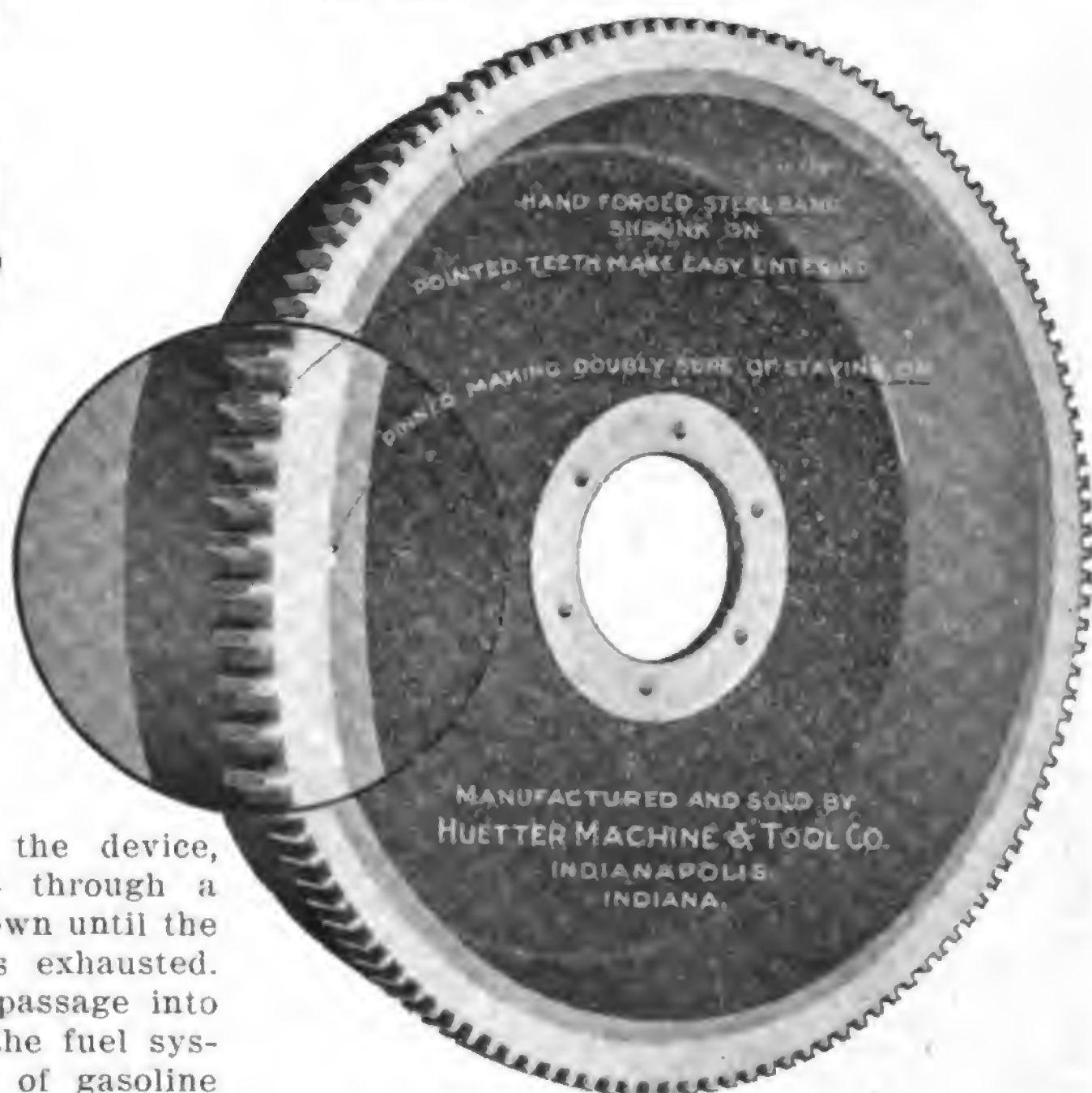
Traction rims of this type are especially valuable to the farmer using power equipment and others who find it necessary to drive over plowed or sod ground and the increased traction greatly multiplies the use of the motor truck. The

rims are bolted to the sides of the regular truck wheels and may be either fitted with lugs or plain rims as desired.

Truck wheels equipped with these rims do not sink into soft spots in the road as readily as regular wheels equipped with rubber tires, as the broad surface offered by the steel rims keeps the wheels on top.

HUETTER STEEL STARTER GEAR BANDS.

The Huetter Machine & Tool Co., In-



dianapolis, Ind., announces that it is now prepared to make quick shipments of its steel starter gears for replacing broken cast gears on the balance wheel of truck engines which are equipped with electric starting motors and gears.

Huetter steel starter gear bands are made from the best of tempered steel and are manufactured for all types of engines using cast starter gears on the balance wheels.

Service station and fleet owners will appreciate the value of these ring gear bands for heretofore it has been necessary, when a starter ring gear had to be changed, to send the balance flywheel to the factory and buy a new wheel with cast gear. Now it is possible, by using Huetter ring gear bands, to give the customer a better gear at from 10 to 50 per cent. less cost. Replacement is simple, as the old gear is turned off in a lathe to a correct diameter of the new gear, heated in a forge to 400 degrees and the band shrunk on to the flywheel, after which three small holes are drilled in the edges between the flywheel and band, retaining pins inserted and cut off flush.

A Railway for Ideas

TWO business concerns with the same physical equipment and opportunities may enter the field at the same time. Yet, within a year, one may forge far ahead of its competitor. You have seen it happen many times. Why? Because one had *better ideas*.

Business failures are nearly all failures of ideas. The ability to acquire and use the right ideas is the measure of success or failure.

For every idea you originate, thousands are originated by others. For every idea you *believe* may work, thousands are tested in the laboratory of experience.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
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American Paint Journal
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Architectural Record
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Automobile Journal
Automotive Industries

Bakers Weekly
Boiler Maker
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Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy

Canadian Grocer
Canadian Railway & Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothing and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton

Daily Metal Trade
Distribution and Warehousing
Domestic Engineering
Dry Goods Economist
Dry Goodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
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Engineering and Mining Journal
Engineering News-Record

Factory
Farm Implement News
Farm Machinery—Farm Power
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Haberdasher
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An idea developed in New York is of no use to a Californian unless he hears about it. That is why there must be "railways" for ideas, channels for the exchange of constructive thought.

Business Papers are the "IDEA RAILWAYS" which bring you the best ideas in the world interpreted in terms of your particular kind of business. They are hardly less important than the railways of iron and steel. Without "Idea Railways" to effect a "meeting of minds" no sales could take place, no goods could be shipped.

A Shipment for You

Think of the money this service makes for you—saves for you. Conceive, if you can, of the increased expense and the crushing handicap which would be imposed upon both you and the concerns from which you buy, were your "Idea Railways" to be abolished.

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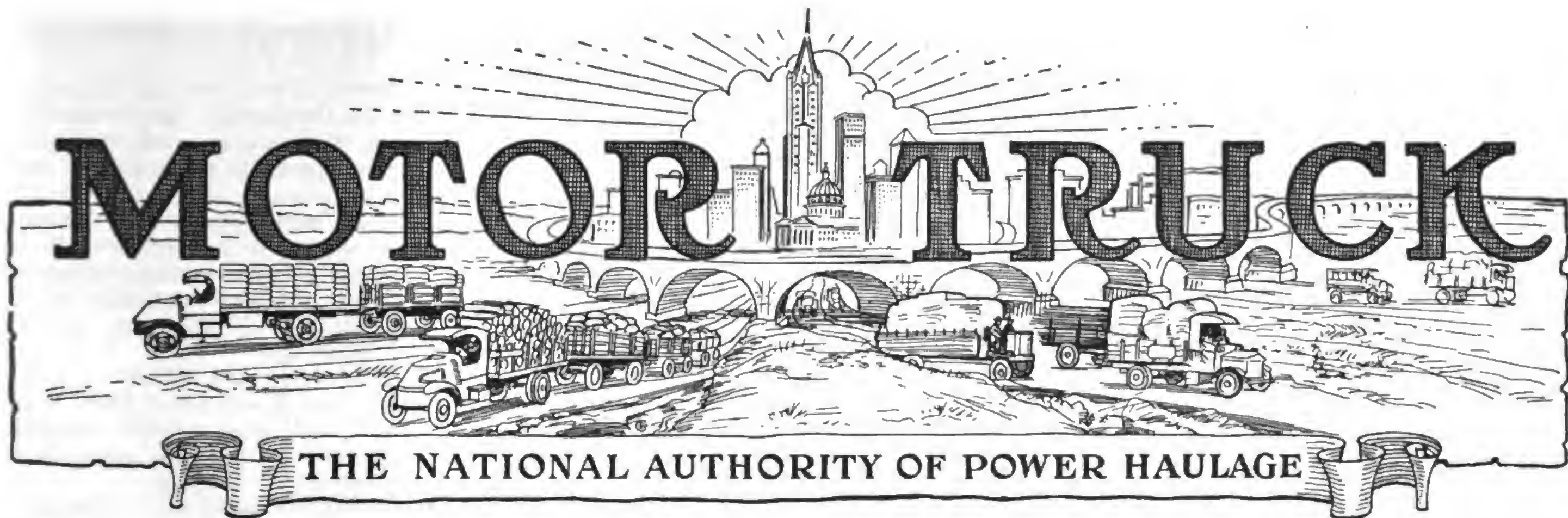
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PAWTUCKET, R. I.

JUNE, 1921.

“All Work and No Pay?”

HOW A DISCOURAGED SMALL-TOWN DEALER REJUVENATED HIMSELF AND HIS BUSINESS, REALIZED HIS AMBITION AND FOUND THAT THE GREENEST GRASS GREW IN HIS OWN DOOR YARD—AN ABSTRACT STORY WITH A SPECIFIC MESSAGE

(By S. G. SWIFT.)

HERCULES undoubtedly did a good job at cleaning up the Ancient's country estate, but he would have found himself beaten by the accumulation of old junk that filled every nook and cranny of the delapidated cross roads

store that belonged through right of inheritance to Jerry Meadows, which is the name he must bear for the telling of this story.

Strictly speaking, the store was not really a store—it was more a warehouse

of disappointed odds and ends of merchandise that had been left over from years of indiscreet buying.

Old horse collars, green with the mould of many months, huddled close to patent medicines of doubtful virtue; pickaxes



There Is a Tendency to Look on the "Grass on Yonder Hillside" as the Greenest, but It Frequently Happens That There Is Some in Your Own Backyard That Is Far Greener. All It Needs Is a Little Cultivating.

and prunes occupied the same bin, and the odor of fertilizer permeated the air with a memory of many departed spring planting seasons. From the ceiling of the building sundry articles of merchandise hung suspended by rope yarns—buckets and pails, kerosene cans and a miscellaneous assortment of tires of various makes.

Here's a country merchant who said that people wouldn't buy from him. He wanted to go "to the city" where there was some business. He found that there was a way to bring the city to him insofar as business was concerned at least.

He made good by learning about what he had to sell—what his territory was worth—how to carefully work it for best results.

The greatest truth he discovered was that the greenest grass doesn't necessarily grow on the distant hill. How is YOUR door yard? Are you cultivating it as intensively as possible?

The tires told a story of yielding to the selling talk of glib-tongued salesmen who had sold them to the proprietor because they felt sure that he in turn could sell them to the motorists who passed through the little town of Planter—passed through so far as Jerry and his tires were concerned, because they never stopped to buy from him. But that wasn't their fault. They didn't even know he had them to sell. He never told them—so it was small wonder that they kept on through to the next town and did their buying there.

But all that was three years ago.

They don't go through to the next town any more. They stop at Jerry's store for their supplies—tires, accessories and oils—and they come again, too.

He does as much business as many city stores and it was all brought about through the interest of a tire salesman who called to try to collect a long overdue bill. This salesman had known that Jerry was usually in the market for almost everything and could be prevailed on to buy without much effort. Therefore, it was but natural that he dropped in on him and sold him a bill of truck tires when he learned that Jerry had taken over the agency for the Powercar truck. It was a good territory for the sale of the truck, he figured, and he had no difficulty in persuading the hopeful proprietor to "take on a few tires just to see how they go."

They hadn't "gone" any more than the trucks had and the salesman, after a few hints from the branch office of the firm he represented was back to get the money or the tires, determined like the true salesman he was to go back with the cash.

"What's the matter with business around here?" he wanted to know after he had engaged the proprietor in conversation for a few minutes.

"Well—they won't buy of me somehow or other. This ain't no place for business. It's 'all work and no pay' as the fellow said," answered the merchant. "I ought to have started in the automobile business in the city. Always wanted to, but this store was left to me so I had to

make the best of it—and that's the worst of it," he added, gazing hopelessly about at the goods that were thrown in helter-skelter confusion around the four walls of the large room.

The salesman was sceptical. "Why this ought to be a live territory," he said. "How many farmers are there around here anyway?"

"Never counted them," answered Jerry truthfully. "Bout a hundred and fifty. Maybe more—I dunno," listlessly.

"Have you got any prospects for the sale of that truck?" the salesman asked, an idea slowly taking shape in his mind.

"No," returned the other. "A few looked at it, but I never heard from them since."

"Didn't you go out after them again?" asked the salesman incredulously.

The merchant shook his head. "If they wanted to buy, why didn't they when they was here? I wasn't stoppin' them," he said truculently.

The salesman laughed grimly "And you're the fellow that thinks he ought to have had a chance in the city." He thought for a moment, then, "how's the truck running?" he asked.

"Good enough, I guess," returned the other. "Was last time I started her up about a month ago. Why?"

"Because you and I are going to take that truck and these tires of mine and get out into the country and sell them. That's why," answered the salesman. "I never sold trucks in my life, but I can run them all right—used to work in a garage—I'm about a day ahead of my schedule and I'd rather take the money back to the office than the tires, so you get the tires all ready to go and I'll have a look at the truck," he said, starting toward the cluster of tumble down sheds at the back of the larger building.

The dealer at first demurred. "Who'll take care of the store?" he asked, doubtfully. "Lock it up and let it take care of itself," answered the salesman. "You haven't sold 10 cents worth of goods in two weeks," and the merchant, who realized the somewhat exaggerated truth of the statement, turned the rusty key in the lock and followed the other to the back yard, after having taken the tires out to the side of the road, at the salesman's direction.



The truck—well nigh buried under a heap of dusty potato bags, had been used as the occasional resting place of a fastidious brood of hens, but was eventually cleaned of its profusion of refuse and pushed out into the yard. The gasoline tank was full and the machine started easily after a couple of turns, despite the fact that it hadn't been used for some time.

"One of the best trucks in the business," commented the salesman, as he gave the engine a cursory survey. "If it wasn't, you wouldn't have seen it start up like that," he said as he drove the

machine around to the front of the store and threw on the tires. "And now you just tell me where to go and we'll see what a little personal persuasion will do."

Then as the other hesitated, "You've got a list of prospects, haven't you?" he asked somewhat incredulously, although he realized that the merchant had in all probability given little thought to the matter.

"We-l-l," hesitated the other. "I did have a few jotted down, but I lost them I guess," he said after vainly looking through a delapidated book he carried in an inside pocket.

"All right, then," said the salesman somewhat impatiently, "doesn't make much difference anyway. Who lives nearest? Somebody who might possibly use a truck if you begged them to?" with thinly veiled sarcasm.

The dealer thought a moment. Finally, "might try Jameson—he's got money and I wouldn't be surprised if he might like to see a truck demonstrated right. Take this road," he indicated as they neared a side road leading away from the main highway.

They were soon at the home of the farmer who had been selected for the first demonstration. He was interested. Would he let Mr. Brown demonstrate the Powercar to him? asked Jerry timidly. He would. He did—and the sale was made.

"Looks like I'd been missing a lot working around with a pair of horses in this hot weather," said Jameson an hour later as he signed the contract for the machine. "Why didn't you tell me how the machine worked?" he asked Jerry accusingly, making out a hundred dollar check "to bind the bargain."

It isn't necessary to carry this story to any greater length. It's pleasant to be able to write it because it is actually true. But the main point has been reached. The impetus given to the country merchant by the simple direct method of selling employed by salesman who had "never sold trucks" worked to advantage in showing the dealer just wherein he lacked and he got busy with good results. He cleaned out the old store, swung an effective paint brush—slightly remodeled his windows for display purposes, restocked the store with salable accessories and made it distinctly a sales and service station, although he still retains a few of the more stable lines of merchandise that he formerly carried.

He installed a gasoline pump, gave free air service and got busy among his customers with the result that today he has one of the most up-to-date businesses that one can find outside of a large city.

He hires several men to help with the work during the busy season and spends his time in combing his territory with a personal canvass that has brought unusual results. His credit is good where formerly he had none—at least a very limited one. He has found his place in the scheme of things and has proven to the satisfaction of this writer and himself as well, that "The greenest grass doesn't always grow on the distant hill."

NEW FIVE-TON SCHACHT TRUCK

Something distinctly new in heavy duty motor truck design is offered by the G. A. Schacht Motor Truck Co. of Cincinnati, O., in a 10-speed transmission, which is incorporated in the five-ton model. There are eight forward and two reverse speeds, with a wide range of

extra reduction and can be used in connection with any one of the five regular speeds—so that there is a lower first, second, third, fourth and reverse.

There are only two movements of the auxiliary gear shift lever—backward and forward. Thus the construction is just

SPECIFICATIONS.

Engine—Buda.
Bore and Stroke—4½ by Six Inches.
Cylinders—L-Head Type, Cast En Bloc.
S. A. E. Rating—32.4 Horsepower.
Cooling System—Cast Radiator with Gear Driven Water Pump.
Ignition—Bosch DU-4, High-Tension.
Governor—Duplex.
Carburetor—Schebler, ¾ Inch.
Clutch—Dry Disc.
Gear Set—Selective Sliding, Located Amidship; Eight Forward and Two Reverse Speeds.
Final Drive—Worm and Worm Gear.
Make of Rear Axle—Schacht Full Floating.
Tires—Front, 36 by 5-Inch; rear, 40 by 6-Inch Dual.
Number of Spokes—Front, 14; Rear, 14.
Width of Spokes—Front, 3 Inches; Rear, 3¼ Inches.
Size of Flange—Front, 12 Inches; Rear, 16 Inches.
Hub Bore—Front, 5½ Inches; Rear, 8½ Inches.
Wheelbase—168 Inches.
Capacity—10,000 Pounds or Five Tons.
Chassis Price—\$5350, f. o. b.



Five-Ton Schacht Motor Truck Equipped with 10 Speeds.

power reduction that will not only permit a high rate of vehicle speed, but also provide tremendous pulling power on low and intermediate gears.

The fundamental principle of the Schacht 10-speed transmission is to enable the five-ton truck to attain a high vehicle speed when conditions justify without the dangerous engine speed which has heretofore been the cause of the majority of trouble, especially with heavy capacity trucks.

The gear ratio in the average five-ton truck will not permit a high rate of vehicle speed, and in order to attain a speed of even 14 or 15 miles per hour when running empty or when operating over good level roads, which the operator will invariably attempt to do, necessitates running the engine at a dangerously high rate of speed, which causes it to wear out prematurely. The consequent vibration when running the engine at a high speed also puts a strain on other chassis parts and a quick deterioration is the natural result.

The Schacht five-ton truck with 10-speed transmission is capable of attaining a speed of 20 miles per hour at an engine speed of only 1000 revolutions per minute. It is maintained that the efficiency of the truck is increased two-fold since it can do more work in a given time and in addition cost less to operate. The uniform engine speed of 1000 revolutions per minute assures maximum life and efficiency.

The 10-speed reduction enables the power of the motor to be more closely adapted to the requirements of the going. It provides sufficient power reduction to pull the truck anywhere, whether sand or mud, provided the wheels can get traction. Faster traveling up grades is possible as the reduction that is exactly adapted to the hill can be used.

The main transmission has four speeds—first, second, third and fourth or direct. The secondary transmission provides an

as simple as with a regular four-speed transmission.

This new Schacht truck is motored by a new and heavier engine with a bore of 4½ inches by six-inch stroke. This engine has been especially designed to stand the strain of increased speed and load carrying capacity which is expected from heavy duty engines of today. It is simple and accessible so that the average driver or repair man can keep it in good condition with a minimum of time and effort.

Lubrication is of the full force pressure feed to all crank and cam shaft bearings through drilled crank shaft pistons, and cylinders are lubricated by oil thrown from the lever ends of the connecting rods.

The Schacht worm drive rear axle is exceptionally heavy and sturdy. It is made in the Schacht factory, as is also 90 per cent. of the entire truck, including frames, steering gears, transmissions, control sets and radiators. The specifications of the Schacht new five-ton truck follow:



White Truck Equipped Specially for Hotel Bus Service.

WHITE BUS IN HOTEL SERVICE.

Two buses, believed to be the most expensive and luxurious in service in the United States, have just been put into operation in Chicago by the management of the Edgewater Beach hotel. They are used to transport passengers between the hotel and down town shopping districts.

With White motor bus construction as the basis, these cars are of special design throughout. Illumination for reading at night is one of the features. Passengers who prefer to ride on the top deck, to smoke or be in the open, ascend to their seats by means of a winding flight of steps.

DEVOE BECOMES DAWSON MFG. CO.'S GENERAL MANAGER.

The Dawson Manufacturing Co., Chicago, Ill., maker of Self-Aligning and Standard grease cups, announces the appointment of R. L. DeVoe as general sales manager. The Dawson company is now in its new factory, 2012-28 Larabee street, Chicago, reported to be one of the most modern plants in the central states.

The Motor Truck and the Electric Car

A BENEVOLENT society in a western city, with usual thought for the unfortunates of this world, was arranging a picnic excursion for poor children and the committee on arrangements had met to consider the things necessary to a successful outing. The transportation question was left to the last, but other problems having been disposed of was finally brought up for discussion.

The chairman, without giving the matter much thought, started to dispose of it with his usual promptness.

"I suppose we'll need about three trolley cars to take the crowd," he judged, busy with pencil and paper. "I'll ring up the trolley company and see what they say," he decided, pocketing his pencil and reaching for the phone.

With the usual good service available in the city in which this story takes place, he readily got the desired telephone connection, only to be informed by an apathetic voice that he had "the wrong number."

"Isn't this the —— street car company." (He wanted to say the "blank" but thought better of it.

"Yes"—answered the tired voice. "Who do you want?"

"I just told you I wanted to speak about hiring a trolley car for a picnic."

"Well—you heard me say you had the wrong number didn't you?" returned the voice with (out) a smile.

"What number do I want?" sweetly asked the chairman, who began to realize the class of person with whom he was speaking.

"Call the second, assistant, assistant, starter of pleasure cars," (or something like that) answered the other.

Eventually the chairman, who was a patient man (having been married for several years), succeeded in getting in touch with the official he wanted. This man apparently knew as little about the matter as possible, but after figuring it up two or three times, while the perspiring chairman hung onto his end of the wire, announced that the price charged would be \$75 a car for the 14-mile trip, with a charge of \$2 an hour for each hour the car was standing still.

TROLLEY CAR HELD 60, COST \$95 FOR DAY.

He also said that the car would hold 60 children. The chairman thanked him and turned to his committee to tell them his story.

"It's an awful price," said he, "but what are we going to do about it?"

"Hire motor trucks," answered a younger member of the committee. "Motor trucks will be cheaper than electric cars."

"Do you suppose so?" answered the doubting chairman.

"I know so," avowed the younger man, who was busily thumbing the pages of the telephone directory. "Here—call this number. It's the biggest truck concern in town," he said, giving the telephone number of a prominent transportation company. The chairman as the other directed. This time he was pleasantly greeted by a voice that indeed conceded a smile and evidenced an interest in the business at hand.

TRUCK HELD 65 CHILDREN, COST \$35 FOR DAY.

"Yes," this is the ——— trucking company," said the voice. The chairman told his story.

"The price of a truck to the lake will be \$35 for the day—our regular price—stay as long as you want—each truck holds 65 children.

The chairman was nonplussed—whatever the word means. But he managed to thank the voice and to order three trucks after a moment of figuring how many times three trucks go into 200 children.

And this wasn't all the service he got. When the person at the end of the wire found that the excursion was for poor children she—the company was owned by a successful business woman—very kindly volunteered to leave the children at the street corners nearest their homes after the return from the picnic.

"They'll be tired you know," she said solicitously.

The chairman gasped—and remembered to thank her. Then he hung up the receiver and turned to the waiting committee to tell them what he had learned.

He was surprised to think that the world had been going ahead while he had been standing still. And he was sport enough to admit it. "Well," he laughed, "I've always thought that motor trucks were handy things to have for general work, but I'll confess I never knew they actually had been developed to the point where they did work cheaper than railroads.

* * * * *

There are a lot of persons who think as he did. It isn't always possible for you as a salesman of motor trucks to give them practical instances of the utility and low operating cost of the truck in a way that will drive home the obvious truth in the manner related.

But there's one thing you can do. You can prepare for your prospect before calling on him by getting a line on his business and confronting him with figures from which he can't escape. Education sells the motor truck. That's the difference between the "salesman" and the "order taker." One educates his prospect and the truck sells itself. The other depends on a proffered cigar and a few kind words. His day is past. Long since.

True salesmanship cannot be defined. It is not only indefinable—it is intangible as well. It consists of many things. Recounting them doesn't do much good, especially if one has knowledge of them and still fails to practise them.

One of the great attributes to successful selling is THOUGHT. Approach, diplomacy and general business psychology all have their place, but THOUGHT, according to this writer's views, is about 65 per cent. of successful salesmanship.

THOUGHT will prepare the way. It will show you just how much leeway to give your prospect. It will tell you when the moment comes to put the pencil in his hand—when to sign him up. THOUGHT will give you a tentative programme by which the prospect may be EDUCATED—and an educated prospect is usually a sold prospect.

The story of the Electric Car and the Truck is a true one, and can be substantiated. Look your prospect over carefully—find how to interest him—and the chances are very much in your favor as to selling him the truck he needs.

Value of Morning Meeting in Training and Developing Truck Salesmen Of Merit

GOT 'em coming fine. They're standing in line to buy trucks just the same as they line-up to buy tickets for a world's series," said the Smart Salesman as he breezed into the office after an afternoon spent at the movies and tossed his grip into a convenient corner. "Yes, sir—," going to get all sorts of orders," he laughed, dragging the Old Bull out of the corner stall and shaking him by the tail.

But the Grizzled Old Dealer had been in the game too long to be deceived by mouth organ music.

"How many did you actually SELL?" he asked, as pointed as the toothpick he was tailoring from a handy match.

on Saturday. "Come on—give me an Alibi—," he said.

"Buyers' strike," grumbled one.

"Waiting for a drop in price," answered another.

The dealer scoffed. "That ain't an Alibi to me," he grunted "That's only a Lullaby. I've heard it so often it sends me to sleep. What do you think is the reason we don't get any business?" he asked, turning to the Smart Salesman, confidently expecting to be handed another "Lullaby."

The Smart Salesman hesitated only long enough to get a good breath. Here was the chance he had long wanted. He meant to make the best of his oppor-

Morning Sales Meetings Will Show You Whether—

1—Territory Has Reached Saturation Point.

2—Prospects Are Called on Systematically.

3—Sales Force Is Efficient.

4—They Really Work for You.

5—You Are Justified in Holding on to Them.

6—You Need a New Sales Force.

Try It.

"Why don't we start morning meetings?" said the salesman after a moment.

"What are they and how do they work?" asked the dealer "In my present state of mind I'm willing to start anything if it looks like an aid to business. So just give us the dope on this morning meeting you spoke about."

Value of the Morning Sales Meeting in Retail Truck Selling.

It isn't necessary to continue this story in the first person. The morning sales meeting is not a new idea at all except as applied to the retail selling of trucks. It isn't strictly an innovation in that sense inasmuch as the writer knows of at least two concerns that have used it

Our Motto:—"It Can Be Done And We Are Doing It"

STATUS OF TRUCK SALES FORCE WEEK OF.....1921.
Today is the of 1921—Only Days More This Week.
SALESMEN!! Study This Blackboard Carefully.

KEEP BUSY.

Prizes for the Week.
First Prize
Second Prize

INDIVIDUAL STANDING OF SALESMEN.

Salesmen	Total Calls	Sales	% of Sales	Amt. Sold	New Bus.	Re-Orders	Used Trucks	Total Amt. Sales	Total Week's Quota	Total % Sold Of Week Quota.
.....
.....
.....

Let's All Boost for a Higher Percentage of Sales.

"MORE CALLS AND MORE SALES."

Tentative Layout for Blackboard Which May Be Used in Conjunction with the Morning Sales Meeting. This Blackboard Is Changed Daily and Keeps an Accurate Sales Record of the Individual Salesmen's Progress. The Actual Layout Should Be Painted and the Salesmen's Names and Data of Daily Sales Written with White Chalk.

"Where's the bacon—that's what interests ME—" he said, shutting his knife and restoring it to his vest pocket.

"We-l-l," answered the Smart Salesman, suddenly changing his attitude—"I didn't exactly SELL any yet—but I got 'em coming fine," with a return to his former jaunty manner. "Got a promise for—"

"Promises don't pay these." interpolated the Dealer grimly, indicating a batch of bills that adorned his desk. "Neither does a lot of Brag.

"I'm right here to say that there'll be a lot of would-be salesmen steamboatin' 'round with a shy shirt tail if I don't get the evidence of more Brains and less Bull from you boys," he avowed.

"Why in haltch don't you boys show me some action? What's the actual reason you fellows can't get business?" he demanded, turning his cold gray eyes on the three young men who adorned his office—apparently for the sole reason of the drawing account that awaited them

tunity regardless of the consequences.

"The big trouble with us fellows is we have never been trained to sell trucks or anything else. During the last few years that was all right. Now it's a horse of another color. It's a plain case of SELLING the trucks, not lining up the buyers and knocking them over with a contract that means they'll get their truck in maybe a year if the factory can produce it," he said truculently, as though expecting a rebuff.

"You told the truth," answered the dealer thoughtfully. "Told the truth and I know it, too," he said, much to the surprise of the others who had looked to see the salesman "bawled out" for being fresh.

"And now that we know the truth, how shall we go to work to find a remedy for the condition that confronts us?" asked the dealer. "I'm serious in this—what can you suggest that will help to educate the whole of us?" he asked. "I need it as badly as any of you fellows.

religiously for something like two years.. It is a business-like way for the truck dealer to handle his sales force in a business-getting manner and as such commends itself to all forward looking truck agents.

It originated in the financial field, so far as the writer knows, and was first practised by a New York security house with exceptional results, and will do as much for the dealer who will inaugurate it, regardless of the size of his sales force.

The meeting should start at 8 o'clock sharp and should continue for 1½ hours. A blackboard should be installed that shows at a glance the daily, weekly and monthly sales record of the different salesmen. This blackboard should be laid out into columns headed with different subjects such as "Number of Calls," "Percentage of Sales," "Quota (to be determined by the sales manager), "New Installations," etc., and space should also be allowed to give definitely

the status of the second-hand sales and the trades.

The highest salesman should tell the others just how he accomplished results, and the man lowest on the list should tell his experiences and the others under the direction of the sales manager should help to set him right, after analyzing by a general discussion his method of approach and his selling talk. These meetings cannot help but instill a spirit of friendly rivalry into the men and wherever tried have proven unusually successful. They show in detail just what the men are doing, show up the drones and give the dealer a comprehensive idea of what is going on in his territory. At the present time there is hardly an investment house that isn't practising this intensive method of getting sales results, and many organizations selling store and office equipment are also getting increased profits from the morning meeting.

Sales Contests Induce Friendly Rivalry.

The use of the blackboard in conjunction with the morning meeting does much to inspire a feeling of friendly rivalry among the members of the sales force, and this may be furthered by sales contests of an unique character.

There are several ways in which these contests can be arranged. One idea that is successfully used by the sales manager of an investment house is to give prizes of a value proportionate to a certain percentage of the sales made during the week, which is started on a Saturday morning so that the presentation of the prizes can be made at the following Saturday morning meeting. This sales manager usually has three prizes, the first consisting of a sum of money which is paid over in crisp, rustling bank notes. The second and third prizes are frequently articles of jewelry, such as tie pins and watch chains. The element of competition and the idea of being among the winning producers rather than the intrinsic value of the prize, seems to have the most weight with the salesmen and one of the hottest contests that the writer knows of was waged for a special prize of a very low priced tie pin set with an imitation black pearl. This pin, which was called the "Corona Prize," was originally the property of one of the older salesmen, who having won first prize for three weeks in succession, took it from his necktie and handed it to the sales manager with instructions that it was to be given as a "perpetual prize" to the best salesman from week to week, changing hands as often as the standing of the leading salesman changed. His proposition was greeted with cheers, the more so when he "started something" by saying that he intended to be the only one who ever got the chance to wear it. The record of the pin was interesting and it changed hands nearly every week for almost a year. The enthusiastic desire to wear it never flagged. Where it is now the writer does not know. It is to be hoped that the original owner still has the right to wear it. One thing is certain, it proved in striking manner the value of stimulating rivalry in the sales force, and demonstrated beyond doubt that

such methods make a big showing on the right side of the bank statement.

Many dealers who are doing a desultory sort of business seem almost to have overlooked the fact that they must depend on sales for the profits and that sales can only be made by hard, consistent endeavor. In the long run the plugger who combs his territory will win out. He will see the monetary value of constantly striving to bring his record up to a figure proportionate with what other dealers are doing and instead of decrying the automotive industry as a poorly paying "chancey" business, will be one of the cheer leaders.

ENORMOUS CROP TONNAGE HAULED ON COUNTRY ROADS.

Eleven principal crops afforded 86,500,000 tons for hauling on country roads in the yearly average of 1915 to 1919, or 27 tons per 100 acres harvested. Among the results of computations made by the Bureau of Crop Estimates, United States Department of Agriculture, it may be noted that Illinois is far in the lead of the states in providing crop haulage, and its fraction of the United States total is one-tenth, or 8,855,000 tons. Iowa has 6,590,000 tons and Kansas somewhat more than one-half of the Illinois tonnage hauled, with 4,862,000 tons. Following in order are Nebraska, Indiana, Ohio and Texas, with 4,050,000 tons in the last named state.

The difference between the high and low costs of hauling, due to poor or good condition of roads, reaches a large figure in the hauling of this great tonnage, or a large fraction thereof.

WILSON MOTOR TRUCK REDUCED IN PRICE.

A substantial reduction in the prices of all models of Wilson motor trucks is announced by the J. C. Wilson Co., Detroit, Mich.

Four sizes of trucks are made by this company and the reductions in prices range from \$380 on the 1½-ton model to \$755 on the five-ton truck. The new and old prices follow:

	Old	New	Reduction
1½ ton.....	\$2650	\$2270	\$380
2½ ton.....	3300	2825	475
3½ ton.....	4300	3685	615
5 ton.....	5275	4520	755

These price reductions go into effect at once.

TEC TRUCK APPOINTMENTS.

Willard C. Brinton, president of the Terminal Engineering Co., Inc., manufacturer of the TEC truck, and varied material handling machinery, makes the following announcement:

J. F. McGonigal, mechanical engineer, formerly of the Foamite company, and J. H. Potter, mechanical engineer, a graduate of New York university, have joined the organization.

M. E. Lyle, for many years with the Columbia Graphophone Co., has been elected a vice president and is directly responsible for new business.

BLAKE NOW SERVICE ENGINEER OF TRANSPORT TRUCK CO.

In further pursuance of his policy of cooperation with his distributing organization, Milton A. Holmes, president and general manager of the Transport Truck Co., Mount Pleasant, Mich., has announced the appointment of E. A. Blake as service engineer of the company.

Mr. Blake's assignment to this position is considered of paramount importance inasmuch as he is eminently qualified for the work he has undertaken.

For two years and a half he has been in the experimental division at the Transport factory under the direction of N. A. Wise, chief engineer. Before joining the Transport organization he was assistant superintendent of the Republic Truck Sales Corporation's motor division at Alma, Mich. He had served also as foreman of inspection in the motor plant of the Curtiss Aeroplane Co., Inc., of Hammondsport, N. Y., and was earlier connected with the Maxwell Motor Co., Inc., of Detroit and the Standard Motor Truck Co. of the same city. He is a member of S. A. E. and Old Timers'

STANDARD STEEL TAKES OVER VIM TRUCK.

Automotive as well as business circles generally will evince a keen interest in the announcement that the Standard Steel Car Co. of Pittsburgh, Pa., has taken over the Vim Motor Truck of Philadelphia and will operate it as one of its subsidiaries.

The entrance of such a well established organization as the Standard Steel Car, with headquarters at Pittsburgh, Pa., and subsidiary manufacturing concerns located in many eastern as well as western cities, into a dominating position in the motor truck field is significant in that it means the rounding out of a cycle of transportation units by a controlling company with enormous facilities at its command.

PISTON RING BUSINESS BOOMS.

The American Hammered Piston Ring Co., Baltimore, Md., is shipping large quantities of its rings to the Pacific coast via the Panama canal. This route has been found economical and dependable. In spite of the fact that 3000 miles separate the factory from the distributors on the coast, shipments have been going ahead consistently to all of the large cities in Washington, Oregon, California, Nevada, Colorado, Utah and Idaho.

OLD TIMERS TO FORM SECTIONS.

One of the most important matters to be considered by the directors of the Old Timers' club will be the plan for the formation of sections. In every city of the country, in every section of the country, Old Timers have come forth anxious to take up the work of organizing a section in their city or state. As planned each of these sections will have a board of officers and will be an organization within the organization formed to carry out the objects of the parent body.

JACKSON HEAVY-DUTY ENGINE USES KEROSENE AS FUEL

HEAVERY duty engine manufacturers have been experimenting for several years on the development of an engine that would successfully handle heavy fuels in commercial vehicle or tractor work. Kerosene as a fuel appeals strongly to the commercial vehicle user on account of its lower price, an item which will materially lessen the operating cost of the vehicle and at the same time allow the engine to develop its full rated horsepower.

The Petroleum Motors Corporation, 1467 Michigan avenue, Chicago, Ill., has perfected a type of internal combustion engine which is stated to have been thoroughly tested during an extended period and is claimed to successfully handle kerosene for fuel.

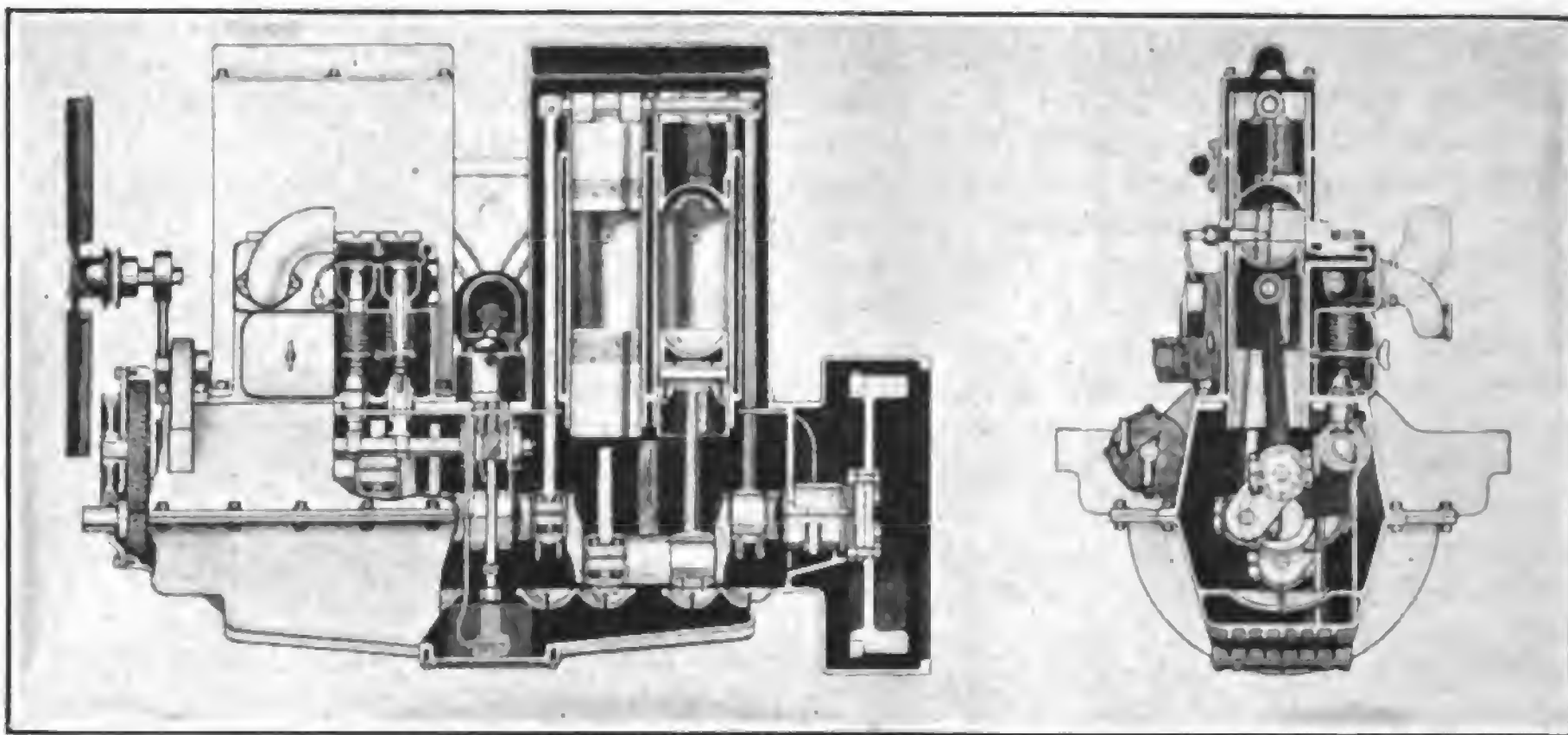
Construction of Jackson Engine.

The Jackson petroleum engine is a new type of internal combustion engine that operates on the four-cycle principle and uses two pistons instead of one in each cylinder. Two connecting rods are used in each cylinder, the long rod operating the upper piston and the short rod the lower piston, each being actuated by the turning motion of the crankshaft.

The engine is a four-cylinder, four-cycle, L-head type, having the cylinders cast in pairs, each pair being bolted to the upper half of the crank case by steel alloy stud bolts.

Each pair of cylinders is fitted with a metal cover which completely encloses the cylinders and the valve mechanism is enclosed by separate covers fastened by wing nut stud bolts.

The crank case is divided into two sections, upper and lower, the upper section being fitted with cast webs, which support the crankshaft main bearings, the camshaft bearings and the valve mushroom tappets, while the lower half is removable, allowing free access to the connecting rod and main journals for adjustment. An oil reservoir occupies the center portion of the lower half, the ends of the case sloping towards the center, where is located the driven oil pump and oil screen. An opening is provided under the oil pump and screen which allows



Interior View, Jackson Kerosene Engine, Showing Form of Combustion Chambers, Valve Mechanism, Etc.

draining of the oil in the reservoir and removal of the screen for cleaning. Fins are cast on the underside of the case, which facilitate cooling of the oil in the reservoir and causes it to be supplied at a more even temperature at the bearings.

A shelf or pan is cast in the lower part of the base, which is equipped with troughs under the connecting rods, holding a sufficient amount of oil for lubrication purposes and the dippers on the rod bearing caps pick up the oil and circulate it through the motion of the rods to all the interior parts of the engine and bearings.

The upper section of the crank case has a forward extension cast integral with the case which forms the timing gearset case and cover, while a rear extension forms the flywheel housing, which is fitted with arms, also cast integral with the case, which form the rear engine supports, by which the engine is fastened to the truck frame.

The crankshaft is a three-journalled type, having eight connecting rod bearings instead of the conventional four. Four pistons and four rods operate in the conventional manner, while the second set of four pistons and rods consists of long rods having the pistons located in the top of the cylinders and operated

from the top of the cylinders, the long rods extending up the outside of the cylinder and water jacket, making connection to the wristpins at the side of the pistons on the end of the wrist pin. The upper pistons are fitted with three piston rings and the lower pistons with four rings above the wristpin. Contrary to usual practise the heads of the pistons are made concave instead of flat. This type of construction places the circular shaped combustion chamber between the two pistons. The spark plug is located in the side of the cylinder in the center of the combustion chamber. Conventional poppet valves provide for admission and expulsion of the gases; these are operated by the regular camshaft driven from gears in the timing gearset.

Method of Operation Unique.

The engine is especially adapted to heavy grade fuel and has four cylinders, with a bore of $4\frac{1}{4}$ inches and an effective stroke of $6\frac{1}{2}$ inches, and making use of several unique features. At the moment of explosion the combustion is perfectly spherical and practically all of the metal exposed to the flame is power producing. In other words, the pressure is directly against the heads of the two pistons, which move away from each other as the gas expands.

Cylinders one and two, three and four operate together as contrasted with the ordinary type of gasoline engine in which pistons one and four and two and three operate together. The action of the engine is briefly as follows:

On the intake stroke the pistons of cylinder one recede away from each other, producing a very high vacuum in the combustion chamber. When the lower piston has reached its lower center a port is uncovered in the side which gives access to the valve chamber. At this moment the intake valve is wide open and fuel and air, which may be carbureted from any ordinary type of carburetor, pushes into the space between the two pistons.

This action is particularly positive because of the great difference of pressures that exists between the combustion chamber and the outside air. The piston



Selden Truck Equipped with Jackson Kerosene Engine Used in Test Work to Prove Power Value.

Truck Service Essential for Industries

now starts on its compression stroke. The lower piston ascends and closes the valve port, while the upper piston descends and the two pistons coming together practically at the same time except for the 90 degrees difference in the crank throws, compress the gas very rapidly, thus reducing the amount of air lost through leakage. With the lower piston at its highest point and the upper piston 90 degrees from its lower point, the explosion occurs. The lower piston descends while the upper piston ascends for a period of 90 degrees crank travel, when the upper piston starts on its downward stroke. At the moment that the upper piston starts on its downward stroke its rate of travel is comparatively slow, because at this point it is on its dead center. The lower piston is at this moment traveling at its maximum rate, and is exerting its maximum energy on the crank pin.

The lower piston on this stroke uncovers the port leading to the exhaust valve, the port remaining open while the piston completes its stroke and starts back on the exhaust stroke scavenging the cylinder of the exhaust gases and preparing it for the incoming fresh charge of gas.

Pitted Valves Unknown in Jackson Engine.

It is stated that the valves in this engine are never in contact with the gas during the moment of ignition. A spark plug with an extended shell is used so that the spark occurs at the center of the spherical chamber.

The four-cylinder models of this unique engine are now in daily operation and will soon be applied to a number of trucks. The engine specifications adhere closely to S. A. E. standard practise throughout.

One camshaft is used and the cams are integral with the shaft, which is driven from a helical gear in the timing gear-set. The tappets are of mushroom type, positioned by stirrups fastened by bolts and nuts, the casting to which they are fitted being a part of the cylinder casting and forming a ledge at the side of the cylinder block.

Ignition is supplied from a high-tension magneto attached between the cylinder blocks, while an ordinary type of carburetor is fitted to the intake manifold, no special device being used to pre-heat the kerosene before entering the combustion chambers of the engine.

A series of tests were recently made with this engine, using a Selden 2½-ton Model A truck, with no load, 2.5-ton and 3.84-ton loads. The tests were reported entirely satisfactory, the manufacturer states, and demonstrated the fact that a truck could be operated with this type of engine under usual transportation conditions, using kerosene as fuel, at a considerable saving in operating costs.

Carburetion was supplied by a Stromberg type M-B-2 1¼-inch carburetor having a 1 1/16-inch choke and a No. 54 bleeder. The air intake pipe was connected to a stove around a small section of the exhaust manifold, and no other method of heating the air, fuel or mixture was used.

"I was greatly impressed by a typical case recently heard before the Public Service commission of Nevada," says V. P. Whelan of the Spencer Reed Co., local Kissel distributor.

"It illustrates the superiority of truck transportation in economy, utility and speed of operation.

"Two Italian brothers, who have been operating a small motor truck haulage company for some time, applied to the commission for a certificate of public convenience. The application was opposed by a short line railway company operating on the same route as that served by the Italians.

"The railroad had a strong moral argument. It was in possession of right-of-way, had been operating satisfactorily and was paying considerable taxes. The investment in the railroad was very large. It was estimated that its scrap value was \$450,000. It was argued that the addition of a competing carrier would depreciate its revenue and would result in poorer service and higher charges. The railroad claimed that the truck company could not operate all the year round. It asked that the truck company be compelled to adhere to tariff schedules, to be made to erect depots and be ordered to deposit bonds in the amount of \$10,000.

"The two Italian brothers simply argued service. Their partnership owned a few high grade motor trucks. With them they covered a 50-mile route in 3¼ hours, picking up and delivering freight at residences, farms, mines, warehouses and stores. Deliveries were direct. Railway freight shipments took as many days as they took hours. Their truck service had actually been affected less by weather conditions than the railroad had been. A great many customers supported the statements of the brothers, saying that the service rendered was superior to that of the railroad and that a volume of local business was dependent on the truck haulage, and the commission ruled that the truck service was necessary to the agricultural, live stock, mining and commercial industries of the community."

CLARK-TURNER APPOINTS ENGLISH DISTRIBUTOR.

The Clark-Turner Piston Co. of Los Angeles, Cal., manufacturer of Deluxe light weight cast iron pistons, announces the appointment of the Laystall Motor Engineering Works, Ltd., of London, England, as distributor of Deluxe pistons for Great Britain and Ireland.

The Laystall company is one of the leading British motor engineering firms and the connection with the Clark-Turner company should prove of great mutual profit on account of the unusual facilities for distribution.

RICKARD ADVERTISING CONCERN CHANGES NAME.

The corporate name of Rickard & Sloan, the well known New York advertising house, has been changed to Rickard & Co., Inc., and it will specialize in industrial and technical advertising. The directors are J. R. White, W. L. Rickard, H. F. King, O. S. Tyson, H. L. Fisher, Julian Gran. The officers are as follows: President, W. L. Rickard; vice president, O. S. Tyson; treasurer, Julian Gran; secretary, L. F. Maher.

WHITE HAULS PINEAPPLES IN HAWAII.

Just such so-called roads as these improvised lanes through pineapple fields are the type of highway over which the veteran three-ton White truck shown herewith has made 100,000 miles for the Hawaiian Pineapple Co., Ltd., of Honolulu, since 1916.

The Trojan White is the dean of a fleet of nine White trucks now in the service of the Hawaiian Pineapple Co.

ADVERTISING MAN OF PACKARDS.

James T. Aubrey has been announced as the new advertising manager of the Packard Motor Car Co., Detroit, Mich., to succeed W. H. Holmes, who has resigned. Mr. Aubrey was formerly western manager for the Cosmopolitan.



White Three-Ton Truck Owned by the Hawaiian Pineapple Co., Honolulu, Hawaii.

TIER-LIFT TRUCK FOR INDUSTRIAL SERVICE

LAKESWOOD ENGINEERING CO., Cleveland, O., announces that it is in production with its new Tier-Lift Industrial truck, which has been designed to meet industrial conditions requiring a truck which could be used to advantage in the factory for tiering heavy finished and unfinished stock and for loading stock into cars for shipment.

The construction of the Tier-Lift Industrial truck is unique in that it is capable of handling loads of two tons or less in any part of the plant and has the ability to raise the loaded platform from the floor to varying heights from five inches, which is the height of the platform when loading at the floor level, to an extreme height of 96 inches.

There is need of an industrial truck that will quickly and economically pick up and carry loads to their destination and elevate those loads to heights sufficient for piling material into box cars, stock rooms and other places where cranes are not available. Such a machine should combine all of the good features of a load carrying truck and a tiering machine.

The Lakewood Engineering Co. sensed this need two years ago and the development of such a machine was undertaken. Various designs were tried and finally, after months of experiment and exhaustive testing, the Lakewood Tier-Lift Storage Battery truck was developed to its present degree of mechanical simplicity and perfection.

The machine meets the demand for a speedy and efficient load carrying truck that will mechanically pick up, carry and deposit its load. It also meets the demand for a machine which will elevate its load to heights ranging from 12 inches to 96 inches from the floor without rehandling. Combining these various features into one machine gives the Tier-Lift truck a wide range of usefulness in practically every industry.

Four Tiering Heights Available.

The machine is built in four tiering heights, 42, 60, 76 and 96 inches. Much of the design used in the Tier-Lift truck is the same that was developed and has for over eight years, it is stated, been

used in Lakewood-Gallon tractors and trucks. The Tier-Lift idea is not, therefore, an experiment. The only new feature which has been added is the worm lift, and the high efficiency of such mechanisms has long been known.

It is stated that the Tier-Lift truck serves practically every purpose of a load carrying industrial truck, as it will, with its own power, pick up or deposit its load by means of platforms, racks, skids or boxes which may be provided with wheels or casters as the conditions under which they operate may require. In addition the machine will, by electric power, elevate its 4000-pound load to heights of 42, 60, 76 or 96 inches, or any intermediate height. This high lift feature increases the storage capacity of a given floor space from 200 to 500 per cent., it is stated, and broadens the field of usefulness of the Tier-Lift over that of the ordinary lift truck to such an extent that there is practically no limit to the uses of this new machine in material and transportation work.

In these days when the demand for low cost of production is so great the perfection of this truck is particularly timely. By doing heavy lifting heretofore done by man power, the machine not only makes the work of the men easier, but reduces the number of men required. Because it does the work quickly and works with the same high efficiency throughout the day, the truck is an important factor in increasing production.

The truck does, to a certain extent, the work of a crane. It has however, the advantage of not being limited to operation in a certain part of the plant, as the machine can go to any point in the plant, pick up its load and transport it wherever desired and unload either into a commercial vehicle, freight car, or to tiering bins, to whatever heights are desired, within its range of lift. Because of its ability to operate in crowded spaces the truck's efficiency is considered very high. In plants where the loads are heavy and it would be desirable to load the trucks as near to the manufacturing machines as possible, the

ability of the truck to operate in confined spaces is especially valuable.

Saves Man Power in Industrial Plants

The Tier-Lift truck with its elevating platform can be used to perform work that usually requires several men to accomplish. In one plant eight men were required to place a 850-pound die in a power press. It usually took these men 30 minutes to do the work and frequently some of the men were injured. The Tier-Lift machine was able to put the die into place in only a few minutes time.

To increase the storage capacity from 200 to 500 per cent., and to facilitate the quick removal of material from any part of each storage tier, without disturbing any part of the pile other than the one wanted, and to increase the storage capacity of a given area, tiering racks have been developed.

In designing these racks sufficient clearance is provided for the Tier-Lift platform to be inserted under the material to be removed. To remove the material from any part of the rack the Tier-Lift platform is inserted under the desired skid, the platform raised about an inch and the truck run backward until clear of the rack. The platform is then lowered to within five inches of the floor and the load carried to its destination.

Selective Tiering of Stock.

The advantages of selective tiering, made possible by the high lift of the Tier-Lift truck, are very evident where the store room or warehouse contains such a variety of material that to store it in piles according to each kind of stock would be impractical. With the Tier-Lift truck the problem is easily and quickly solved. It is, of course, desirable to store the smaller parts in the lower racks. Bulky material, such as large shocks, boxes, or baled goods, can be stored on the top platform of the rack and piled as high as desired. Sometimes the material to be stored is of such a nature that the supporting skids are not needed. In instances of this kind the load is laid on the supporting angles in the racks. This is sometimes possible when storing sheet metal, cases of paper, dies, crated goods, etc.

Non-Selective Tiering of Stock.

When the material in each pile is of one kind, where vertical space is at a premium, and it is not necessary to remove a particular platform or box without disturbing the loads in other parts of the rack, the non-selective type of rack may be used. When this method of tiering is used the top shelves must be loaded first. The bottom shelf is the last one to be filled. Similarly, when removing the loads the bottom shelf must be emptied first. This method of operation is necessary because with non-selective tiering only two-inch clearance is allowed between the top of load and bottom of platform above. This is not enough space to permit inserting the Tier-Lift platform.

The non-selective method thus necessitates a clearance of only two inches between shelves, compared with the eight-inch space required for selective tiering,



Heavy Material Easily Handled in Industrial Plants by the Use of Tier-Lift Truck.

resulting in an additional six inches of vertical storage space for each shelf.

Should it be desired to so arrange the racks, a combination of selective and non-selective tiering can be easily effected to permit the most economical handling.

In planning the operation of the Tier-Lift to effect maximum economy, the Lakewood company offers the services of a corps of experienced industrial haulage engineers, who will gladly recommend only the haulage equipment that will earn maximum profit to the user.

Description of the Tier-Lift Industrial Truck.

In designing the Tier-Lift Industrial truck, simplicity and accessibility were two features which were given exacting thought and consideration. The same high efficiency worm drive as is used in the Lakewood tractor and truck were used, thus permitting the maintenance of an installation of haulage units at the lowest possible cost. The driving mechanism is totally enclosed, running in grease.

The drive is from the electric motor to a steel worm and bronze worm gear and bevel gear differential, through driving shafts to bevel gears to drive the wheels, thus effecting a continuous high efficiency drive whether driving straight ahead or turning the sharpest curves.

This type of drive has been in use for eight years by the company in tractors and trucks of their manufacture and its efficiency is proved by the fact that on the first machines built this same drive is today giving satisfactory service.

Steering is effected on all four wheels, which permits turning in a circle of 92 inches radius. This allows ease of operation in narrow aisles, freight cars, loading platforms and any congested part of the plant. Steering is controlled by a horizontal lever moving up or down, conveniently located so as to be operated according to the direction in which the truck is going. The truck may run in either direction.

External contracting band brakes contract on a large sized brake drum mounted on the main drive shaft and operated by foot pedal on platform.

The truck is controlled by three speeds forward and three speeds reverse, which allow speeds of three to 6½ miles an hour without load, and with load speeds from 2½ to five miles an hour. The controller is conveniently located for operation regardless of the direction of travel. It is of the steel drum type having a positive neutral stop, adjustable renewable contact fingers and incorporates a simple but positive safety operating switch as part of the controller.

Separate Controller for Tier-Lift Platform.

The Tier-Lift controller is a simple, specially designed device, allowing one speed in either direction which controls the up and down operation of the load platform. The controller is equipped with adjustable and renewable fingers and incorporates contacts operating a dynamic brake which stops the load platform instantaneously in any desired position. This controller is automatically returned to neutral when the load plat-

form reaches its maximum tiering height, or its extreme down position, by a simple mechanical interlock.

Motor Equipment Ample for the Work.

The driving motor consists of a 24-volt, 65-ampere, series wound, high efficiency motor having an ample overload capacity to safely take care of the maximum output of the batteries. The armature is mounted on high grade annular ball bearings and the entire motor is enclosed and dust proof.

The Tier-Lift motor is an entirely separate, independent unit, which is mounted on an elevated platform. The motor is a 24-volt, 40-ampere series wound high efficiency unit of ample overload capacity to lift the maximum loads recommended for the truck with an ample factor of safety.

The brake action and safety switch are controlled by a foot pedal on the platform. The arrangement is such that the brakes are fully released and the switch closed when the pedal is pushed down flush with the floor. When the operator steps from the truck or removes his foot from the pedal the safety switch in the controller automatically breaks the current, at the same time automatically setting the brakes, stopping the truck immediately and making it practically impossible to operate the truck except in the normal position.

The motor operating the tiering and lifting mechanism is mounted at the top of the column and is directly connected through a flexible cushion universal joint to a worm, which actuates two worm gears, each operating a vertical triple thread, high efficiency steel screw.

Loading Platform Unusually Rugged.

The load platform is carried by a cantilever type support. The stresses set up by the load on the platform are distributed from heavy steel rollers, each mounted on two high grade annular ball bearings. The load on the platform is balanced over the load carrying wheels, which eliminates the tendency for the truck to tip when the load is raised. Two adjusting screws are located under the platform to insure perfect alignment of the platform, should the rollers wear slightly after long usage. The load platform is lifted by two forged steel phosphor bronze bushed trunnion nuts which operate on the two vertical steel screws.

The housing in which the two worm gears at the top of the column are mounted is supported on a trunnion, allowing the housing to oscillate, to obviate any possibility of binding on the vertical screws, due to the twisting of the frame or slight wear in the canti-

lever support rollers. This housing is packed in grease, requiring renewal only at long intervals. The frame of the truck supporting the columns and the axles is made of cast steel of rigid construction. The load platform, of corrugated steel, is hinged at the column end, so that if it should strike an obstruction as the load is being lowered, it would simply raise the platform without straining the supporting mechanism.

The battery box is of heavy sheet steel constructed in such a manner that the top and sides may be removed so that the batteries are accessible for inspection or filling.

The batteries, which are regularly supplied with the Tier-Lift Industrial truck, may be either of the lead or nickel-iron type as desired. The lead batteries will be fitted as follows: 12 cells WML Philadelphia, 17 plates, having an ampere-hour capacity of 240, kilowatt-hour of 5.75 and weighing 620 pounds; or 12 cells MVY Ironclad Exide, 17-plate, having an ampere-hour capacity of 252, kilowatt-hour of 6 and weighing 690 pounds. Optional nickel-iron types may be had in 22 cells Edison A-6, having a capacity of 225 ampere-hours and 5.9 kilowatt-hours, weighing 463 pounds; or 22 cells Edison G-9 having an ampere-hour capacity of 225, kilowatt-hours 5.9 and weighing 495 pounds. The truck is equipped with Klaxon horn and an Anderson charging plug conveniently arranged for charging the batteries.

The Lakewood "V" Dump Body Skid.

This type of body has recently been developed to handle coal, ashes, sand, paper pulp, etc., in the quickest possible time with the least amount of labor involved. The body has been designed for use with the Tier-Lift Industrial truck and makes a very convenient and economical method of handling such material in and around industrial plants.

The skid is so constructed that the operation is practically the same as when the ordinary skid is used. The Tier-Lift truck carries empty skids to the loading point and deposits them in a position for loading. While the empty skid is being filled the truck carries away the loaded skid, dumps it either into a truck body, wagon or bin. By using several V-dump bodies the Tier-Lift truck is kept in constant operation.

The dumping is controlled by two hand levers. Raising one of these levers unlocks the body to dump away from the lever and operator. The other lock prevents accidental dumping of the load toward the operator. When the body is righted it is automatically locked.



Fleet of 30 Ford Delivery Cars, Owned by the James Vernon Co., Detroit, Mich., Equipped with Curran Radiators, the Product of Curran-Detroit Radiator Co.

HINTS FOR SALESMEN WHO SELL TRUCKS

"FROM telephone to personal canvass to telephone. That sounds like baseball. It really is a triple play that has sold a lot of trucks for me," said one of the most successful salesmen in New England in recent conversation.

And this is how he does it: It seems that he isn't the most energetic person in the world. Or rather—to do him justice—he doesn't believe in misdirected effort. He makes every move count, and when one gets to be close to 60 he doesn't always feel just like spending all of his time hunting up prospects on foot. Of course the proper thing to do is to interview prospects by the use of an automobile, but this salesman, for certain physical reasons, cannot use a car.

He depends almost wholly on the telephone. Sounds odd? Perhaps—but they sell stock by telephone, and this salesman sells trucks the same way. His method is simple. He merely gets down the telephone or business directory after breakfast and goes through it in a systematic way. Perhaps he may decide to give the manufacturers of his territory a canvass. He jots down all the names of those he thinks will be interested, along with their telephone numbers. Then he sits back in his easy chair at about 10 in the morning and starts calling. Supposing the telephone service to be all that it should be, he gets the private branch exchange of Jones & Co., we will say.

"Let me speak with the purchasing agent, Mr. ———, I forget his name," he tells the girl on the switchboard, who unthinkingly supplies the name of the man with whom he wants to talk. "Mr. Brown?" she says with a rising inflection.

"Brown," exclaims the salesman—"I never can think of his name somehow, but that's the man all right." The connection made he starts a regular selling line of talk, explaining that he is rather too busy to get out there at the moment, but wishes to make an engagement to call later.

If Mr. Brown is interested he either says so or shows by his manner that he is. That is all the salesman wishes to know. He has either received the assurance that the prospect is or isn't interested in a truck, and if he considers it unwise to try and close a deal, tells him that he will call later to show him the truck. He eventually picks out enough live prospects to give him something to work from by the use of the telephone and then calls and sees them. He may sell them on his first call or it may take another day to bring matters to a close. In that case he again employs the telephone for the simple reason that he has discovered that a prospect will many times pay better attention to a telephone conversation than he will to one that is

PEPIGRAMS.

Your **JOB** as a **SALESMAN** is to get those **TRUCKS OFF THE FLOOR** and the **MONEY TO PAY** for them into **THE BANK**. Boiled right down to the cold hard facts, that's what you're supposed to do.

Which Means

More **BUY**—Less **ALI-BI**.
More **BACKBONE**—Less **WISHBONE**.
More **PERFORMANCE**—Less **PROMISE**.
More **CUS-TOMERS**—Less **CUSS-ING**.
More **HEAD**—Less **MOUTH**.
More **BRAINS**—Less **BULL**.

A lot of the **OLD LOFTY LANGUAGE** won't get you anywhere. **LOUD TALK** will call a **DOG**, but it won't **SELL TRUCKS** unless you tie it to the proper amount of **GRAY MATTER** in the proportion of about 90 per cent. **BRAINS** and 10 per cent. **CONVERSATION**. Measured by the **SALESMAN'S YARDSTICK** that means three inches of **PROFESSION** and 33 inches of actual **POSSESS'ON**.

conducted in person, which fact he has many times proven in practise.

On the occasion of the second telephone call Mr. Brown and he are old friends, and it frequently happens that the deal is consummated. This salesman believes that a personal call is frequently necessary to establish friendly connections, but prefers to make his actual closing talk on the second telephone call. This method has done much for the profit side of this man's business, and it should work out well in general practise.

CORRECTIVE PROPAGANDA.

"The old bus 'll stand all you can load on to her," says the ignorant owner who habitually makes a practise of overloading his trucks. Then, at the end of four or five years when the truck, ruined by rank folly, refuses duty he has another tune, and one that hurts the industry more than any other one thing. "No more ——— trucks for me," he mourns. "They won't stand up." And he tries another make or else leaves the industry with a perpetual grudge and joins the class who aver that "the life of the truck is about five years."

Actually, figured as it should be, the life of the truck is closer to eight years, if it has been fairly used. It's this 100 per cent. overload idea that results in the "five years" propaganda, and now is the time for the salesman to start a counter propaganda that the damage done by the one may be compensated for to a degree by the good done by the other.

We're all interested in the development of the truck. We're all an integral part in its present and future, regardless of whatever part we may have played in its past. As members of the great organization that is carrying the industry to new heights of achievement, let us spread a little oil where it will be

most effective. The industry has used us good. Let's return the compliment. We can start in by preaching against the growing evil of overloading. Let's do it.

SELLING TRUCKS BY THE ENDLESS CHAIN METHOD.

It takes a salesman to sell trucks. Either a salesman or a plugger. One may sell by skill, the other by hard work. In any event the result is the same. They get the trucks out of the sales room and the money into the bank. And that's what counts.

There's no royal road to successful truck selling. The plugger wins. So does the salesman. They both practise intensive methods; one is an intensive worker, the other an intensive thinker and a worker as well.

Among the many salesmen that the writer has met is one who was wearing short trousers at the time of the draft and is only old enough for the entering age limit at the present time. But he's a salesman. And a mighty good one, too.

He started selling trucks by trying to be of some assistance to his father, the agent for a well known make of truck, whose two older sons had "volunteered in the draft."

His main idea was to scout up persons who might be interested in the purchase of trucks, but he soon found that he was actually making the sales. His method was simple and will work in one territory as well as in another. It was simply this—he got his prospects from his customers.

For instance, suppose he were to sell a truck to some one. His first question after the deal was made would be, "Now who can you send me to that will want to buy a truck?" and nine times out of 10 he would be given the name of a friend of the person to whom the truck was sold. He would call on this person and tell them that he had sold a truck to his friend. This acted somewhat in the nature of a recommendation and greatly aided in the sale of the machine. This young man still sells trucks by the "endless chain" method and finds that it works as well as ever it did.

SALESMANSHIP AND CONVERSATION.

Don't loosen up with all your selling arguments at once. Salesmanship is somewhat akin to fighting. It's a battle of wits as a rule, and the educated battler never shoots all his punches in the first round. Save your best ammunition until the last and then slip it over when the time comes to get his name on the dotted line.

This, of course, doesn't mean that you want to do too much talking. "Talk until they blink their eye," then hand them the pencil and stop.

FOUR NEW ENGINES ADDED TO WAUKESHA

WAUKESHA MOTOR CO., Waukesha, Wis., announces to the truck and tractor trade four new additions to its already successful series of truck and tractor heavy duty engines, which are especially adapted for this type of service.

The series is known as the High Torque series because of the extreme lugging power developed at low speeds. The new models are as follows: "FU," having a bore and stroke of four by 5½ inches respectively; "CU," with bore and stroke of 4¾ by 5¾ inches; "DU," with bore and stroke of 4½ by 6¼ inches, and "EU," having bore and stroke of five by 6¼ inches.

All the engines of the new series are of the four-cylinder, four-cycle, L-head type of similar design, having removable cylinder heads, force feed lubrication, and are constructed throughout to stand continuous heavy duty service. They have been designed to give the best fuel economy at all speeds at which it is practicable to operate a tractor or truck engine. High torque is developed at low speeds which gives wonderful pulling power below governed speed.

Particular attention has been given to the producing of a line of engines all four engines of which have the greatest number of interchangeable parts without sacrificing accessibility or strength. To illustrate this point: Any service station having a stock of approximately 425 different parts could replace any piece on any one of the four new engines; this, including the screws, nuts and cotters, etc., as well as the more important parts. If, on the other hand, a truck or tractor manufacturer were using four average engines of different capacities it would be necessary for him to carry in stock 1400 different parts in order to service them properly. Thus service can be maintained by fleet owners of two or more of this series with a proportionally small stock of parts.

Constructed on Conventional Lines.

In constructing Waukesha engines the company plans that all engines shall be hung in the chassis frame at three points and they are furnished to accommodate either unit or individual construction.

Standard S. A. E. pads are provided for application of starter equipment and any standard make of magneto can be installed and, if desired, a distributor can also be mounted.

The cylinders are cast in pairs and each cylinder block is fitted with a separate removable head. The crank cases are made of aluminum and the oil pan may be dropped without disassembling either the gear cover or the rear support from the case.

The crankshafts are made of chrome nickel steel and have large diameter journals of sufficient length to give unusually large bearing areas on all models. The crank cases are made unusually deep and are reinforced with ribs to make them very rigid. Combining this feature with a very stiff crankshaft, an assembly is obtained which gives most favorable bearing conditions and will resist the strains of hard service as well as reduce vibration.

Crankshaft Journals Reinforced with Plates.

The main bearing journals are reinforced with heavy steel plates, which add strength and prevent the retaining nuts from cutting into the metal of the cap. Through bolts are used on all crankshaft journals, while all crankshaft and connecting rod bearings are special bearing metal, reinforced with bronze back, and each engine has only two different bearings for both connecting rod and crankshaft. This again cuts down the number of parts required in stock for service work and as two diameters for crank bearings are used throughout the four models, only two reaming tools are required by repairers.

Two Types of Intake Manifolds Available.

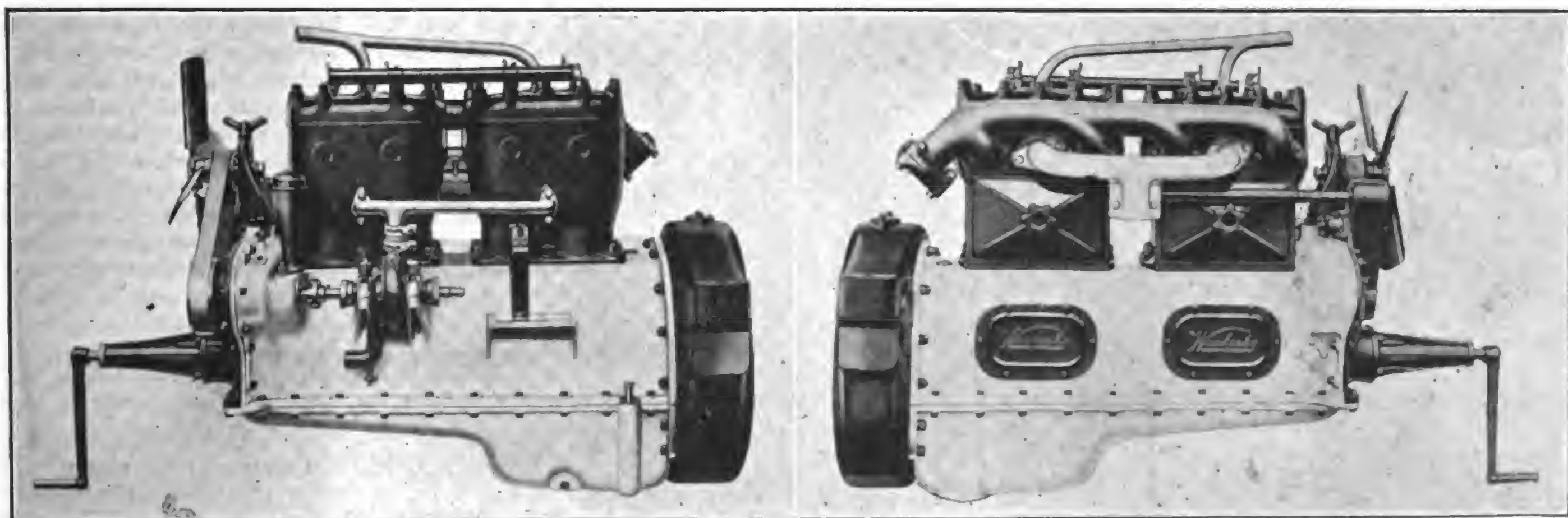
Manufacturers of tractors or trucks are given the opportunity of choosing either separate or combined manifolds with Waukesha engines, the former being adapted for the use of gasoline alone and the latter for the heavier fuels. These manifolds are known as hot spot manifolds and give a minimum loss of power as the incoming gas is heated by induced heat from the exhaust gases before it reaches the combustion chamber.

Each engine is cooled by pump circulation through ample sized water jackets surrounding the engine cylinders. The pump is mounted on brackets which are a part of the crank case housing and is fitted with a bronze impeller. The pump is easily removed in case of breakage and to prevent water leakage about the pump shaft, bronze packing glands are used, which are filled with fiber packing, and in tightening the adjusting nut does not come in contact with the packing. Unusually large water jackets are provided around the engine cylinders and cylinder heads and the water circulation is controlled to give uniform cooling of all parts and to prevent hot spots. One drain cock below the water pump drains the entire water system, which eliminates possible trouble from freezing and greatly simplifies the draining operation. The fan driving pulley is assembled on the pump shaft and a roller bearing is used to carry the belt load.

Force feed oiling systems are used on the engines of this series and a geared oil pump, driven from the engine camshaft by sturdy bevel gears, delivers the oil to the main bearings through heavy annealed bronze tubing. The oil is then carried to the wrist pin bearings through the drilled crankshaft. The oil pump may be removed as a unit and is easily replaced. A reamed hole in the crank case locates the pump and insures proper alignment of the driving gears.

By removing one nut the oil pump screen, which surrounds the oil pump, may be removed and taken out through the hand hole plate in the bottom of the oil pan when cleaning of the screen is necessary. The relief valve for regulating the oil pressure can be adjusted from outside of the engine crank case and the excess oil passes through the escapement valve and is thrown on to the timing gears. The breather has an unusually large opening and heavy lubricating oils can be readily poured into the engine quickly through this opening.

The tappets are fitted with roller type valve lifters which consist of hollow hardened steel shells of large diameter, which are very light weight and operate in individual cast iron guides.



Left, Pump and Breather Side Waukesha Engine. Right, Carburetor and Exhaust Side New Series High Torque Waukesha Engine, Showing Location of Governor.

Reciprocating Units.

The pistons are long and of light weight fitted with a large bushed bearing for the steel piston pin. This pin is clamped into the upper end of the connecting rod in such a manner that the clamping screw tightens the pin only and does not carry any part of the load.

Oil ways are drilled from the lower edge of the lower piston ring, which conduct oil from the cylinder walls to the piston pin bushings for lubricating purposes.

Each engine in the series is equipped with a patented Waukesha governor,

which is adjustable as to speed, and is sealed, self-lubricating and non-hunting, and operates on the intake manifold at whatever speed the governor is set and is operated from the camshaft in the timing gear set at the front of the engine. Each piston is equipped with three piston rings above the piston pin and fits the polished ground walls of the cylinders tightly, preventing the passage of excess oil or gas mixture.

End play of the camshaft is taken up by a coiled spring which bears against the timing gearset cover and a small steel pin, which fits the end of the shaft.

Large hand hole plates are located on the right hand side of the engine in the upper crank case, which allows inspection of the bearings of the crankshaft and camshaft without dropping the oil pan, while the valve mechanism is also enclosed and is lubricated by a fog of oil from the interior of the crank case.

The flywheel housings are No. 1, S. A. E. size on the models "EU" and "DU" and S. A. E. No. 2 on models "CU" and "FU." The housings are cast separately from the crank case upper and lower sections and are bolted to the crank case with steel alloy bolts.

Building Concrete Roads with Up-To-Date Equipment

LEE TRAILER AND BODY CO., 2343 South LaSalle street, Chicago, Ill., claims to be the originator and to hold the patents on the original end-dump body attached to short wheelbase motor trucks designed for hauling aggregates for centrally located mixers and also for hauling concrete to highway work under construction.

Lee end dump bodies are built in $\frac{1}{2}$, $\frac{3}{4}$, one, $1\frac{1}{4}$, $1\frac{1}{2}$, two, $2\frac{1}{2}$ and three cubic yard sizes and in single, dual or triple section hopper, but for all practical purposes only three sizes need be kept in mind: The dual hopper having a capacity of one cubic yard per hopper, a single hopper having a capacity of two cubic yards and also a single hopper having a capacity of one cubic yard.

It is only within the last two years that the adoption of the hopper method of handling wet concrete and asphalt has come into general use. Previous to their general adoption it was necessary for road construction work to be carried on by a large crew of helpers and the location of the mixing plant had to be close to the job, the helpers wheeling the mixed concrete from the mixer to the road bed in wheelbarrows, spending much valuable time in handling and spreading the concrete on the construction job.

With the adoption of the end dump hopper type of body, mounted at the rear of a short wheelbase truck with pneu-

matic tires, the necessity of a large crew of helpers and locating the mixer on the job was partially eliminated for, by using a fleet of several trucks so equipped, stationing the mixer at a central point and working in first one direction and then another, considerable valuable time was saved and a larger amount of concrete was laid in a day's time.

Many instances are given by the Lee Trailer and Body Co. showing in dollars and cents the saving made on road construction jobs throughout the West and other sections of the country.

Five Years' Experience Built Into 1921 Model.

The original Lee automatic end dump body was built and patented early in 1916, served as a demonstrator by the Smith-Form-a-Truck Co. on one of its first attachments, and was used at Atlanta, Ga., hauling gravel and rock. In 1916 and 1917 fleets were used by contractors and gave excellent results in hauling and road construction work.

Although the single hopper was popular during the 1920 season, the company feels that the double hopper type will be used in great numbers during the 1921 season as the mixers are now being made with larger capacities and the call will necessarily be for a truck equipped with a double hopper having larger capacity and hauling a batch that will meet the needs of the enlarged mixers.

The road contractor's truck, equipped

with pneumatic tires, is made to different specifications and, for this special type of work should have the following characteristics: The wheelbase should not exceed 120 inches and the frame should end directly back of the rear spring hangers.

The special short coupled truck, pneumatic tired, should not be thought of as a special job unsuited for other purposes, or for use with anything but a Lee body. Contractors always have heavy materials to haul and do not require a long loading space even when a stake or express body is mounted on the chassis.

The short wheelbase truck has one big advantage—its greater ability to turn around on a narrow road, either with or without the assistance of a turntable, and it also makes an admirable tractor for either semi-trailers or four-wheeled trailers.

Features which recommend the Lee end dump body are the simplicity of control of the dumping mechanism, as there is only one handle to pull and this is easily reached from the driver's seat. The sturdy construction of the hopper enables it to withstand successfully the hard and severe usage of road construction work. The smooth interior surface is without rivet heads or obstructions of any kind which facilitates the flow of the wet material.

The steep dumping angle of the Lee body allows it to dump readily wet concrete or asphalt and clear the body at one operation. Sufficient height is given the body sides to allow the required capacity to be carried without spilling.

The various sizes in which the Lee end dump bodies may be purchased adapt them for use with practically any short wheelbase truck, including the Ford one-ton truck, many of these units being used by road contractors in fleets, equipped with either two single or one double hopper according to the individual requirements of the fleet owner.

SOFIELD RE-ENTERS AUTOMOBILE FIELD.

Hilton W. Sofield, former vice president and general manager of the Keystone Truck Co. of Philadelphia, as well as builder and designer of the Keystone truck, has re-entered the automobile field after a nine months' retirement.



Two Cubic Yard Single End Dump Body Unloading Aggregate.

Motor Truck Doubles Savings Account

A PRACTICAL DEMONSTRATION OF THE LOW COST OF THE COMMERCIAL VEHICLE AS COMPARED TO THAT OF HORSES IN DELIVERY WORK

THERE is an unusually successful vegetable dealer who operates in the vicinity of Boston who does not hesitate to say that the motor truck is directly responsible for his present prosperity. For the very good reason that he thinks publicity might invite competition, he requests that his name be withheld. This is not essential to the story so long as he is willing to relate the facts of the matter, which are about as follows:

It seems that this man started in business 10 years ago. Working with a horse and wagon he covered a route of 100 customers three times a week and made money. By the time the war started he was working on two routes, which took him practically all of the six working days of the week, and even carried him over into Sunday morning at times. He was getting his vegetables from a wholesaler, and felt that he had about reached his limit of money making. As a matter of fact, subsequent events proved that he was doing all of that and then some.

The prices for horse feed began to advance, and he found that the two animals which he owned were becoming an item of more than nominal expense. At this juncture his son, who had frequently helped him, was taken in the draft. This saddled additional work on to him, and it seemed as though he "was busy the whole 24 hours of the day."

To add to his troubles the wholesaler with whom he traded went out of business and another took his place. This man was not easy to do business with, and he found his profits growing smaller with each successive day. His wife urged him to let the business go and apply for his old position in a factory. Good wages and overtime looked good to him

How a produce retailer discovered an efficient and satisfactory method of increasing his business without increasing his labor. This man was nearly forced out of business by his competitors before he found a way to do more selling at a lowered cost.

and he had about decided to sell his horses and go back to his former occupation when a motor truck salesman drove into his yard and changed the course of events.

He was ready to grasp at any straw that would save his business, and consented to go for a drive with the salesman. He had no intention of making a purchase when he started out, but a large amount of his sceptical ideas had vanished when he came back from the trip. He thought the matter over for a day or two and when the salesman came in again, suggested that he be driven around his route.

Right there he got a revelation. He found that his two routes could be covered in less than half the time that was required by using the horse. Added to this was the very desirable fact of his being able to go into Boston for his supplies in about one-third of the time required by using a horse. In all but the matter of expense of operation he was satisfied that the truck was a vital necessity. The salesman, when told of the expense of keeping the two horses, soon

showed that the truck could be operated at a lower figure and the sale was made.

A few lessons made the new owner proficient, and he started out on his route. He started for Boston early in the morning, got the best of the vegetables while they were fresh, arrived home at 7 o'clock and after breakfast started on his day's work. He had formerly figured on eight hours as necessary to cover each route, and was highly elated to discover that he could cut the time in half with his truck. Being of a progressive nature he decided to use the extra time in going after more customers and soon was serving nearly twice as many as he formerly had.

At the end of the first month he figured up his expenses and allowing a good amount for depreciation and overhead, decided that the truck cost less to maintain than the horses had. He was more than convinced of the truth as the months went by and now says that with the increased number of customers he is able to handle he has been able to double his savings and he works a good deal less time than formerly.

Added to this is the fact that he doesn't have to "feed the truck while it is resting," and when he drives it into his stable at night he doesn't have to bother with taking any further care of it. He has not only gone after new business, but has extended into other lines as well. He sells fowl and chickens to his customers for Sunday dinners, and has frequently delivered as many as 300 orders on a Saturday morning. He is an enthusiastic booster of motor trucks in general and says that a profitable produce business could never be done under present conditions "by the old method of following a horse's tail."

To Open Union Motor Truck Depot at Detroit

The construction of a union motor truck freight depot is to be undertaken at Detroit, Mich., under the management of William Seitz. This is to be operated along lines similar to a successful enterprise of the same nature at Minneapolis, Minn. This proposed union depot is designed to take care of all the motor transport lines now running into the city. It will be the first of three projected units to be constructed as the transport business expands.

A large part of the farm produce now sold in Detroit is brought in by express. This is an inefficient way of handling it, according to Mr. Seitz, when compared with the more flexible and cheaper motor truck system of transport which is

scheduled with the new depot as a center in Detroit.

Shippers are inconvenienced by not knowing where to send their goods for the quickest service. With all lines running on established schedules into a common depot, a radius within 125 miles of Detroit will be served much more quickly and at less cost than by the present methods.

Three classes of service are planned: The fast express which will carry rush package freight between the various cities in the system, the "loco service" which will make stops at farms and small towns on its route, carrying in food products, and the through freight for heavy truck which will unload at the

door of its consignee.

A cut in the retail prices of farm products may be expected as the result of the establishment of this depot, as it is reported that the Minneapolis project resulted in transportation charges on foods shipped in from the farms being cut in half.

PACIFIC COAST BUSINESS BOOMING.

"Conditions on the coast are just about as good as I ever saw them," says R. T. Wilkinson, sales manager of Klaxon Co. of Newark, N. J. He has just returned from a tour of the western territory and brought this good news back with him.

COST SECONDARY TO SERVICE

(By H. C. PARKER, Secretary, Chapman Decorative Co., Philadelphia, Pa.)

"NATURALLY in our work it is not a question of how much the trucks are costing us as of the service they are giving us. We are using three three-quarter GMC trucks. That they are giving satisfaction is best proved by the fact that we purchased the first truck in April, 1915; the second in July, 1916, and the third in January, 1919. All are equipped with cord pneumatic tires.

"These trucks were on the job continuously during 1919, operating every business day. Our trucks average 50 miles a day—some days they go 150 miles and other days only 20 or 30 miles. But we figure their cost on a basis of 50 miles a day. During 1919 our No. 3 GMC truck operated 307 days, every business day, traveled approximately 15,350 miles, and not one cent was spent for repairs. These trucks average eight miles to the gallon of gas and 199 miles to the gallon of oil. The daily cost, including pay of driver, is a few cents over \$15, and their cost per mile less than 31 cents.

"Just what do we mean by service? In a nutshell—giving our patrons what they want when they want it.

To New York for One Package.

"For example, one of our patrons had immediate need for a package ordered from New York. To insure the promptest possible delivery we sent one of our GMC trucks up to New York for the sole purpose of bringing back that package. You could almost have carried it under your arm—but that wasn't the point. Our patron wanted it then and we delivered it as a matter of course. The truck more than paid for its original cost on that one trip, by convincing that patron that we would let nothing stand in the way of satisfactory service.

"Then it not infrequently happens that one of our patrons wants some special piece of furniture in a hurry—perhaps a chair that must be delivered in time for a dinner or dance that evening. Even if our patron lives 25 or 30 miles away, a truck takes it out—there is no quibbling about the distance. The main thing is to get the chair there, and the few dollars special delivery charge is gladly paid by the satisfied patron.

Serves 16,000,000 People.

"Runs to Atlantic City, New York, Wil-



Modern Black Maria Used for Transporting Prisoners. Two-Ton Federal Truck Operated by Bronx County Jail, New York City.

mington, Harrisburg, Trenton, N. J., and other neighboring cities, are nothing unusual with us; and we are prepared to handle contracts anywhere within a hundred miles radius of our Philadelphia factory. As this takes in a population approximating 16,000,000 people, you can see the important part the motor truck plays in our business.

"But wider range and prompt deliveries are not the only advantages we desire from our motor trucks. We do interior decorating down to the last detail. When a house is built we will put in the interior wood work, finish out the walls, design and manufacture the lighting fixtures, design and manufacture the furniture, buy the rugs, put up the curtains and finish the house complete. If desired we work from the architect's plans, so that by the time the building contractor has finished his work our trucks are at the door to begin installing the furnishings.

"We also fit out special rooms in hotels where people are living by the year. Another branch of our business is fitting up public buildings.

"Another very important point is that on such jobs we may need certain material without delay. Instead of depending upon the express companies to send it out from New York, or wherever it may be obtainable, we send our trucks after it, and have it on the job two or three

days quicker than would otherwise be possible.

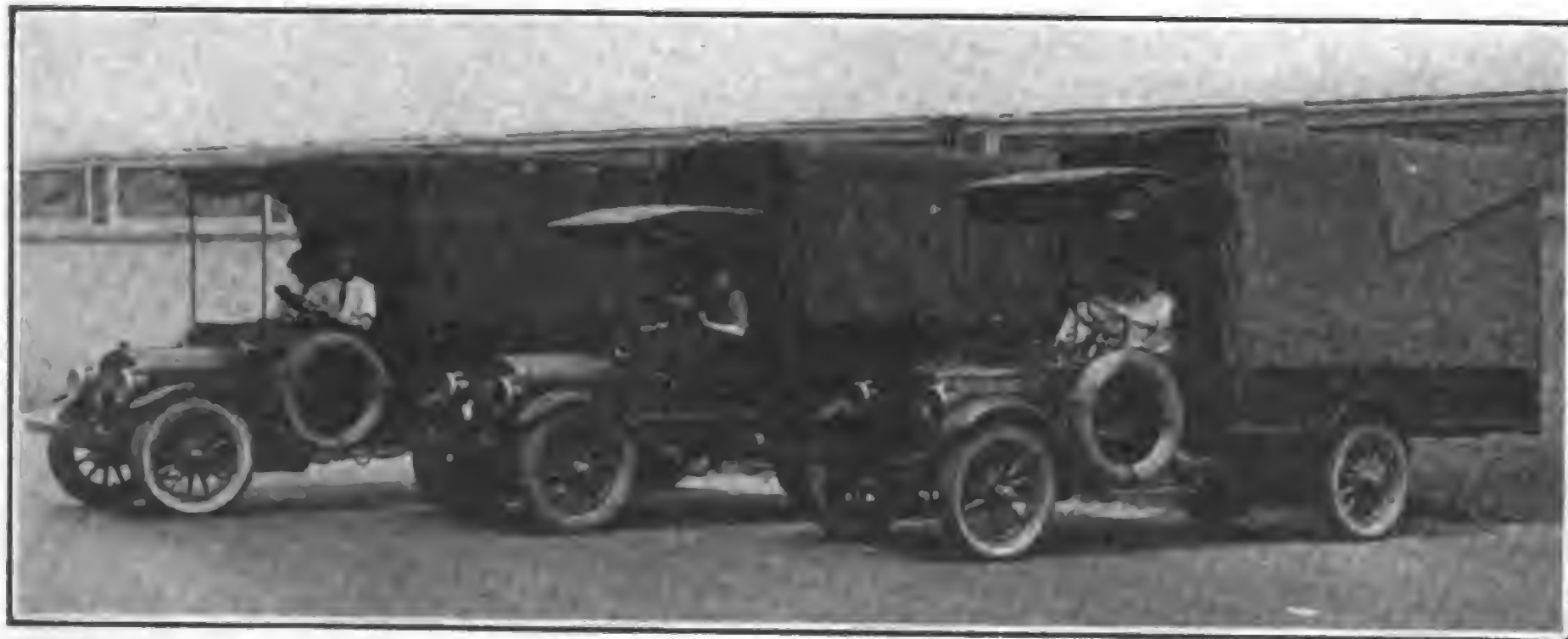
Goods Always in Own Hands.

"But for our purpose the biggest advantage in using motor trucks is that they enable us to deliver direct from our factory to the place of installation, so the material is never out of our hands. Suppose, for example, we are completely furnishing a house, making all the furniture, supplying rugs and draperies, and other details. If the house is located 50 or 75 miles away it would be necessary to crate this furniture and send it by express or freight to its destination. Upon its arrival the patron must make arrangements for having it conveyed to the house, must have it uncrated and put in the proper rooms. At best this is slow work, and should be done by people who understand it. And even with the utmost care there is always the danger that some fragile or expensive piece will be badly damaged in packing or while in transit. Obviously, such service would be far from satisfactory to our patrons.

"On the other hand, with motor trucks our own men make the delivery, place the furniture in the proper place in the proper rooms, even lay the rugs in the proper place on the floors, and leave everything complete and in order. This method saves our patrons much trouble and inconvenience. It also enables us to show the articles in the best possible light, by having our patron first see them in their proper place with proper surroundings.

"The very satisfactory service we are getting is undoubtedly due in part to the fact that our drivers are very interested in their work. We give them a bonus of \$10 or \$20 per month, depending upon how their work turns out. This bonus is not based entirely upon what they do, but also upon what they don't do. This bonus system has proved very satisfactory, as it is an added incentive for the men to do things right."

Traffic specialists agree that the left hand turn of streets is the most confusing to motor vehicle drivers.



Three GMC Trucks Used by Chapman Decorating Co., Philadelphia, Pa., Give Service as Well as Economy in Operation.

NEW GARFORD 34-TON TRUCK

THE already extensive line of trucks manufactured by the Garford Motor Truck Co., Lima, O., has recently been completed by the addition of a new three-quarter ton model. The announcement of this new Garford, known as Model 15, has created much interest in automotive circles. It is expected to take its place quickly as one of the leaders in its tonnage class. The general characteristics and features of the heavier Garford types are embodied in its construction.

The Garford is producing bodies for this chassis, those of the foremost mention being the flareboard express with standing top (removable type), curtains and built-in windshield and the full panel type fitted with built-in windshield.

Numerous orders have already been booked for the new model and the Garford distributing organization is answering many inquiries concerning it. Early and speedy production will be made possible, it is stated, by the added facilities of the recently completed progressive assembly unit at the Garford factories.

The list prices, f. o. b. Lima, announced on this model are as follows:

Standard chassis equipped with seat, \$1590; standard chassis with express body, \$1780; standard chassis with panel body, \$1815.

Amplly Powered by Buda MU Engine.

The Model 15 Garford truck has a load capacity of 1500 pounds and a body weight allowance of 1000 pounds. The truck is amplly powered by a Buda Model MU four-cylinder, four-cycle, vertical, L head engine having a bore of $3\frac{5}{8}$ inches and stroke of $5\frac{1}{8}$ inches, developing under S. A. E. rating, 21 horsepower. Three-point suspension is used in mounting the engine in the chassis frame, two points at the rear of the engine and a single point in front. A trunnion support is provided on the front of the timing gearset case, surrounding the crankshaft, to which is fitted a bracket fastened to a cast cross member, attached to the side members of the chassis frame.

The cylinder heads are detachable to allow for grinding valves, cleaning carbon, etc.

The crankcase is divided into two sections, upper and lower, both of which are of gray iron construction. The crankshaft is a three-journal type, fitted with bearings of ample size, and provided with a flange, forged integral with the shaft to which the flywheel is fastened.

The valves are of generous size, the mechanism being enclosed on the right hand side of the engine in an easily accessible position. The valves operate in an oily mist from the crank case, and are protected from dust and grit by large hand plates on the side of the engine.

Ignition is furnished by a battery system using one set of spark plugs, while the control for the advance and retard are located on the steering wheel.

Carburetion is furnished by a Stromberg carburetor using gravity feed from a fuel tank located on the dash. The carburetor is of the automatic float feed type, located on the right side of the engine. A large sediment trap is mounted on the dash shut-off valve, conveniently located.

Lubrication of the engine is by a full force feed system delivering oil to the three main journal bearings under pressure. Oil ducts drilled in the crankshaft conduct the oil from the main journal to the connecting rod bearings and, after being thrown off by the bearings, the lubricant is sprayed in the form of a mist on the cylinder walls. The upper connecting rod bearings are lubricated by splash. The camshaft bearings are lubricated from the pressure system, oil from the main journals passing upward through cast ducts into the camshaft bearings.

Sufficient Cooling Area Provided.

Cooling of the engine is accomplished by means of a long plain tube type radiator mounted in the conventional position, ample water jackets surrounding the engine cylinders, combustion chambers and valves of the engine, and a centrifugal water pump driven from the timing gearset of the engine, while a large four-blade, 18-inch steel fan driven by a wide flat belt cools the engine sufficiently under all conditions of service.

The radiator which is of tubular construction, consists of a core and tanks built up as a unit and secured to a pressed steel radiator shell. Rubber cushions interposed between the radiator base and the cross member relieve the radiator of frame stresses.

Standard units are used throughout in the construction of this new model, a Borg & Beck clutch, single plate, dry disc type being used in connection with a Garford three-speed selective forward and one reverse type transmission gearset. The gears and shafts of the transmission are of nickel steel and the transmission and clutch are in a unit with the engine and flywheel.

The propeller shaft is divided into two sections between the transmission and

rear axle, three Spicer universal joints being used, while a center bearing fastened to a cross member, which is allowed free movement, prevents the shaft from slipping.

Final drive is through a worm and worm gear to the floating axle shafts to the rear wheels. Two complete sets of brakes are supplied, both internal expanding, operating independently on the rear wheels. Both sets of brakes are equalized by special equalizing arms provided in the brake linkage.

The springs are semi-elliptic front and rear, the front springs are 40 by $2\frac{1}{4}$ inches and the rear springs 50 by $2\frac{1}{4}$ inches, made of alloy spring steel.

The control of the truck and engine is by means of an accelerator mounted on the floor boards, spark and throttle levers on the steering wheel and brake and gearshift levers in the center of the chassis, while the brake and clutch pedals are located at the left in the conventional position.

The lighting switch and panel board are mounted on the dash within easy reach of the driver. The frame is of pressed steel, channel section, hot riveted and reinforced with gussets and cross members.

Steering is accomplished by means of a worm and full wheel type steering gear mounted on the left side of the chassis. The steering wheel is 18-inch notched hand type.

The front axle consists of an I-beam section, drop forged in one piece of heat treated steel. The knuckle joints are Elliot type, having plain thrust bearings and of special truck design.

The rear axle consists of the latest type worm drive, the worm being of hardened steel, mating with a bronze gear and surrounding a bevel type differential. The road thrust on the wheels is taken by wheel bearings independent of the differential bearings. The differential carrier supports the bearings of the worm shaft and forms a unit of the worm, worm gear and differential, containing all the bearings and adjustments necessary for these parts. The rear axle housing is of pressed steel, special truck design. Timken bearings are used throughout which are of the taper roller type providing long wearing qualities.

The wheels are 12-spoke artillery type



New Garford 1500-Pound Truck Offers Many Possibilities for Fast Delivery Service.

of unusually heavy construction, fitted with bearings in the hubs both front and rear.

The wheelbase of the Garford three-quarter ton truck is 132 inches or 11 feet. Length of frame back of driver's seat is 96 inches or eight feet; length from dash to center rear axle, 104 inches; length from rear to center of rear axle, 61 inches; tread, center to center of wheels, front, 56 inches; rear, 56 inches.

The truck is equipped with Giant cord pneumatics front and rear, special truck type, 34 by 5-inch tires being used front and rear, which is considered ample in size under all conditions of service.

The gasoline tank is located on the dash, is of locked seam construction made up of terne plate, having lapped heads, with the inside coated to prevent rust from forming and has a capacity of 12 gallons of fuel.

A speedometer is mounted on the dash panel, which is connected direct with the transmission. An air pump of the single cylinder, air cooled, high pressure type is bolted to the power take-off of the transmission and furnishes air for tire inflation.

The equipment includes dash, two electric head lamps, one electric rear signal lamp, one electric dash lamp, lifting jack, complete set of tools, mechanical horn and oil can; complete electric lighting and starting system using standard six-volt, 90-ampere battery, starter with automatic shifting pinion and generator direct connected to the timing gearset of the engine.

The speed of the truck is rated at 25 to 30 miles an hour, no governor being used.

The total gear reduction in high is given as 6.25 to one.

MOTOR TRUCK FREIGHT RATING REDUCED TO SECOND CLASS.

J. S. Marvin, manager of the traffic department of the National Automobile Chamber of Commerce, announces that notification has been received of favorable action on the request for the reclassification of motor trucks and chassis when shipped in carload lots to points west of Chicago and the Mississippi river where items reading "automobiles, freight, set up, loose or in packages, carloads, first class," will be changed to read "second class." The item which now covers "chassis, loose or in packages, in carloads, first class," will also be changed to second class.

The saving in freight charges on a 15,000-pound load of trucks amounts to \$35.25 on shipments to Kansas City or Omaha; \$68.25 to Dallas, Galveston and Houston; \$88.50 to Denver; other western points in proportion. Pacific coast rates are not changed, the special rates to that territory having been continued in effect.

WESTERN PLANT FOR UNITED MOTORS.

The United Motors Co., Grand Rapids, Mich., is to build a factory to assemble and distribute its products on the west coast and in Mexico.



Frank W. Ruggles, President of New Ruggles Motor Truck Co., Saginaw, Mich.

NEW OFFICIALS FOR BIJUR MOTOR APPLIANCE.

The Bijur Motor Appliance Co. announces the appointment of the following new officials:

S. S. Jenkins, formerly Detroit manager, to be general sales manager, with office at Hoboken, N. J. Previous to his connection with the Bijur company, which began in 1920, he was district manager for the Willard Storage Battery Co. in Detroit and Indianapolis for eight years.

Ivor McCalla becomes service manager, bringing to that position the training of an engineer, having been associated for the past 10 years with the technical service of some of the country's largest automobile manufacturers. He was recently with Willys-Overland and before that in the engineering departments of the Trego Motors Corporation of New Haven, Conn., and the Packard Motor Car Co. of Detroit, Mich.



Frederick P. Nehrbus, Works Manager of Weidely Motors Co., Indianapolis.

RUGGLES HEADS NEW SAGINAW MOTOR TRUCK CONCERN.

Announcement was recently made of the completion of the organization of the Ruggles Motor Truck Co. in Saginaw, Mich., capitalized at \$2,000,000.

Frank W. Ruggles is universally recognized as a leader in the motor truck industry. Under his guidance as the president and general manager the Republic Motor Truck Co. of Alma, Mich., grew to be one of the largest motor truck manufacturers in the world.

The new Ruggles Motor Truck Co. has ample financial backing and with Mr. Ruggles' truck manufacturing knowledge and experience and his keen insight on the successful marketing of motor trucks, the new Saginaw enterprise is assured of rapid and lasting success.

It is expected that the first truck model will be ready for showing in July.

The elected officers and directors are as follows:

President, Frank W. Ruggles; vice presidents, W. J. Wickes and Julius B. Kirby; secretary, Ezra L. Smith; treasurer, Walter C. Hill; assistant treasurer, Charles T. Kerry; counsel, John F. O'Keefe.

Directors—Frank W. Ruggles, W. J. Wickes, Julius B. Kirby, Ezra L. Smith, Walter C. Hill, Charles T. Kerry, John F. O'Keefe, Benton Hanchett, R. T. Robinson, Otto L. Dittmar, John J. Thorne, Harry H. Price.

NEHRBAS JOINS WEIDELY MOTORS CO.

Two real veterans of the automotive industry were brought together with the announcement that Frederick P. Nehrbus has become associated with George A. Weidely, as works manager of the Weidely Motors Co. of Indianapolis, Ind.

The history of both Mr. Weidely and Mr. Nehrbus is brimful of interest. Mr. Weidely as vice president and engineer of the concern which bears his name, turned to the design of motors, while Mr. Nehrbus has had charge of the actual production, although he is also an engineer, being a member of both the S. A. E. and the A. S. M. E.

Mr. Nehrbus' debut in the automobile industry was in July, 1900, when he built and tested the Auto-Bi for the E. R. Thomas Motor Car Co., remaining with this organization until 1911, when he took charge of the production of the Alco automobiles and trucks. In 1913 Mr. Nehrbus became associated with the Lycns-Atlas Co. of Indianapolis as factory manager and was an important factor in this concern until he joined the Premier Motor Car Co., which concern he successfully piloted through the war period building government trucks with possibly the best record in their class. He only recently left the Premier company to join the Weidely organization.

SCHARFF JOINS MULTIBESTOS.

Andrew Scharff has been appointed district manager for the northwest territory by the Multibestos Co., Walpole, Mass. His headquarters will be in Minneapolis.

FOUR-WHEEL-DRIVE FIRE TRUCK IN NORWAY.

That motor equipment will eventually become standard in the fire departments of the larger towns and cities throughout the world is fast becoming a known fact.

The accompanying photograph of the newly acquired FWD fire truck at Rjukan, Norway, gives evidence that foreign countries also are seeing the advantage of motorized fire departments.

A motorcycle squad in this foreign city is used to advantage as a speed unit and in many cases is able to handle the fires with chemical fire extinguishers before they have gotten a good start.

The truck is an FWD chassis, manufactured by the Four Wheel Drive Auto Co., Clintonville, Wis., mounted with a special body after its arrival at Rjukan.



FWD Truck Fully Equipped for Fire Service, Rjukan, Norway.

DENBY TRUCK SALES INCREASING.

Earle Sutton of the Denby Motor Truck Co., Detroit, is making a very extensive trip investigating general conditions as affecting the motor truck business. Meetings with Denby district managers have been held at Nashville, St. Louis, Milwaukee, Minneapolis, Portland, San Francisco and Denver.

At every distributing point in the United States the Denby demand is said to have steadily increased since Jan. 1, and all Denby dealers are convinced that 1921 will be a banner year for them.

Charles E. Davy, former sales manager of the Universal Products Co., Detroit, has joined with the Denby Motor Truck Co. as district manager. He was formerly experimental engineer for Denby and is well qualified to be of great service to all Denby dealers in his territory. His headquarters are at the factory.

A. J. Hersey, one of the pioneer motor truck salesmen of the northwest country, has rejoined the Denby Motor Truck Co. as district manager, with headquarters at Minneapolis. He will take care of Denby dealers in the Dakotas and Minnesota, where he is known to practically every automotive dealer in business.

MOTOR BUS LINE ESTABLISHED IN PERSIA.

This Federal truck, shown in the illustration, has started on its long journey across the Atlantic and through Europe to Bagdad, whence it will be driven across the desert to its final destination—Teheran, the capital of the ancient kingdom of Persia. The dwellers in that sleepy old city—which, by the way, is a metropolis of nearly 300,000 people and an important commercial center, particularly for rugs, carpets and tapestries—will now, perhaps, experience for the first time the thrill of getting out of the way for a modern mail and passenger bus to be operated by the Parsis Yaganegi company, which has had this Federal truck specially built and equipped for that purpose.

The motor truck is not only proving its efficiency in this country, where it is superseding electric lines and stub railroads for many hauls, but even in far-away places, such as Teheran, where, for centuries transportation facilities have been limited to the camel, the ox and the lowly donkey. The Federal was chosen for this work only after a very careful investigation, in view of the fact

that service stations and cheap gasoline are unknown quantities in that country, and the truck must stand up and give service day after day under conditions which are entirely unknown in this country.

A passenger compartment occupies the rear of the body and provides leather upholstered side seats for from eight to 10 passengers. It is separated from the baggage room by a screen partition with sliding door. Each side has single drop windows, while the passengers enter and leave by double rear doors with a step below. A rail around the top provides additional space for luggage.

PEASLEY SUCCEEDS TUCKER AT OLDS WORKS.

"America Is a Country of Opportunity." Thus reads a sign in one of the Olds Motor Works offices. To prove it Guy H. Peasley becomes sales manager of the Olds Motor Works, Lansing, Mich., one of the biggest and most progressive units of the General Motors Corporation.

Mr. Peasley was born in St. Clair, Mich. He went to the Olds Motor Works organization in 1911 as stenographer and bill clerk in the sales department, from Port Huron, where he was employed in the Port Huron Engine and Thresher Co., and has worked up through the various positions to the big desk he now occupies. For 4½ years he was distribution manager. During the past year he has been assistant sales manager, where he further firmly established himself in the confidence of the distributing organization.

Mr. Peasley succeeds Charles A. Tucker, who resigned last week to return to the Nebraska Oldsmobile Co., Omaha, Neb., of which concern he is the president and general manager. This company has just erected a \$350,000 building in Omaha, and Mr. Tucker finds his business interests there require his entire time and effort.

Motor trucks take care of 15 per cent. of the entire haulage of the country—360,000,000 tons by trucks per year as against 2,400,000,000 tons by the railroads.



Federal Truck in Bus Service, Persia.

U. S. Trucking Directors Selected for Important Service

TWO directors of the United States Trucking Corporation, the largest commercial trucking organization in the world, were recently selected by Governor Nathan L. Miller of New York to serve on commissions charged with recommending solutions of two of New York city's most serious problems, the transportation of freight from railroad and steamship terminals and the transportation of human beings on the rapid transit system.

Alfred E. Smith who became chairman of the board of directors of the United States Trucking Corporation on his retirement from the governorship of New York last January, has been appointed as one of the three New York commissioners of the port of New York with authority to negotiate a treaty with the State of New Jersey providing for the future development of the port.

Officials of the United States Trucking Corporation have made a thorough study of the need for transferring freight between terminals in New York at greatly reduced cost and with increased efficiency. James J. Riordan, president of the corporation, is the head of the Merchant Truckmen's Bureau of New York, organized to bring about cooperation between the trucking companies, the city government and the merchants in handling commercial transportation problems.

Discussing the need for prompt steps to safeguard the commercial supremacy of the port of New York, Ex-Governor Smith said: "Governor Miller has announced that he believes the development of the port will be the biggest factor in the programme for more economical food distribution in the state. I agree with him.

"The port of New York is suffering from competition with other Atlantic and gulf ports, because of the immense cost of handling freight at the New York and New Jersey terminals. John J. Mantell of the Erie railroad, whose opinion is accepted by all students of port development as being the best expression along that line, recently stated that it costs as much to handle a ton of freight at the New York terminal as it does to haul it from Buffalo to New York. As a large part of the freight entering the port of New York is food stuffs, one can readily imagine how that adds to the cost of living, and what a burden it puts upon New York manufacturers where the freight is raw material for manufacture in this city.

"It must be borne in mind that New York city is the greatest small manufacturing center in this country. Furthermore within a radius of 50 miles of City hall there is a population of approximately 8,000,000 people whose daily needs alone are very great.

"Any solution of the port problem must, therefore, have for its ultimate result the lowering of the costs of doing business at the port of New York. Added to the actual operating costs is the great waste that occurs from delay in the

handling of freight. The trucking problem becomes one of great importance when it is realized that horse drawn and motor drawn trucks are compelled to stand for hours at the various terminals awaiting their turn to get on the docks. This must, of necessity, be reflected in the cost of trucking and consequently in the cost to the ultimate consumer. No relief can be had from these conditions until development is carried on jointly with the State of New Jersey.

"The development of the port, like all other great projects, will take time. In the meanwhile there is offered, as a temporary solution of the problem of freight congestion, the idea of store door delivery of freight. That would do away with congestion at the piers now caused by requiring each consignee to call for his own freight. It is a very frequent occurrence to see a large double truck waiting at a terminal for one or two cases of merchandise. By zoning the city and having the delivery store door handled by a single agency, freight could be removed from the terminals seven tons at a time. The terminals could be entirely cleared in the morning hours of the day, leaving the afternoon free for the receipt of west bound freight.

"The one serious objection offered to this plan is the fact that it denies the merchant owning his own equipment the right to do his own trucking from terminal or store door delivery. This objection could be readily met by having the Interstate Commerce Commission quote an alternate rate for either terminal or store door delivery. Our merchants should be made acquainted with the fact that where they do not own their own equipment store door delivery will bring about a more economic handling of freight by relieving the congestion. It will have for its effect the reduction in the cost of doing business at the port and removing at least to some degree the handicap that the port of New York is now suffering in competition with other ports of entry on the Atlantic coast."

The second United States Trucking Corporation director to be honored by Governor Miller is Major-General John F. O'Ryan, who has been named on the new Transit commission, which has a mandate from the legislature to develop a comprehensive plan for placing the rapid transit lines on a business basis. General O'Ryan is head of the National Guard in New York state. He commanded the 27th division during that unit's operations in Belgium and France.

AXLE AND WHEEL STANDARDIZATION BY S. A. E.

An axle and wheel division has been appointed by the Society of Automotive Engineers' council to consider the standardization of axles and wheels and the parts germane thereto. The personnel of the division is as follows:

Chairman, G. W. Dunham, Savage

Arms Corporation; vice chairman, C. C. Carlton, Motor Wheel Corporation; T. V. Buckwalter, Timken Roller Bearing Co.; R. J. Burrows, Clark Equipment Co.; J. Coapman, Russel Motor Axle Co.; C. S. Dahlquist, Eaton Axle Division of the Standards Parts Co.; F. W. Gurney, Gurney Ball Bearing Co.; George L. Lavery, West Steel Casting Co.; A. M. Laycock, Sheldon Axle & Spring Co.; C. T. Myers, construction engineer; A. L. Putnam, Detroit Pressed Steel Co.; J. G. Swain, Firestone Steel Products Co.; G. J. Thomas, Duplex Truck Co.; H. Vanderbeek, Timken Detroit Axle Co.

This division will cooperate with the truck division on hub standardization, which the latter has carried on during the last two years. The present programme includes standardization for passenger car front axle hubs and, if feasible, passenger car and motor truck rear axle hubs. Other subjects before the division are brake drums, differential gears, emergency rim clamps and metal wheel felloes.

Magneto Standardization.

Interchangeability of stationary engine, isolated electric lighting plant and tractor types of magneto is considered one of the important problems before these industries at the present time. A subdivision of the electrical equipment division has therefore been appointed to study this subject and comprises F. W. Andrew, chairman; A. D. T. Libby, J. M. Edwards, representing the stationary engine division; W. F. Bogerd, representing the tractor division, and F. L. Tubbs, representing the isolated electric lighting plant division.

Fan Belts and Pulleys.

The S. A. E. Subdivision on Fan Belts and Pulleys has recommended that the included angle or V belts and pulleys shall be 40 degrees. This angle was recommended after a careful review of V belt practise, which varies from 28 to 45 degrees, and in view of the fact that it was felt that with the smaller angles the wear on the belts is excessive, while with the larger angle the heavier belts cause excessive slipping at higher speeds owing to their greater weight and the resulting centrifugal force.

Lock Washers.

A report has been submitted covering revisions of the present S. A. E. standard for lock washers. Three series of lock washers are recommended, "Standard," "Special Light" and "Special Heavy," for both S. A. E. standard bolts and standard machine screws with either round or fillister heads.

Flexible Discs.

The parts and fittings division is working on the standardization of flexible discs for magneto couplings and universal joints. Although flexible disc universal joints have not reached a final state of development, it is thought that standardization will do much to establish a single satisfactory series of mould sizes and facilitate interchangeability.

Out of a total vote of 478,036, the Kansas good roads amendment received a favorable majority of 91,342 votes. Of 105 counties in state, 72 were favorable to amendment, 32 unfavorable and one tie.

INDIANA HEAVY-DUTY TRUCK ENGINE

INDIANA TRUCK CORPORATION, Marion, Ind., is at present equipping its two, 2½ and 3½-ton motor trucks with an engine of its own manufacture which the company states is proving ample for all transportation work in which the vehicles are employed. This engine has been in successful use for three years and has withstood the severest tests.

The engine is a heavy duty, four-cylinder, four-cycle, L-head type, having a bore of 4½ inches and stroke of 5½ inches and a piston displacement of 294 cubic inches, developing 27.2 horsepower under the N. A. C. C. rating at 1000 feet of piston travel a minute.

The cylinders are cast in pairs, of close grained gray iron, and are subjected to hydraulic tests, aged for a considerable period to insure finish after grinding, and are fastened to the top of the crank case by means of steel studs and nuts.

Ample water jackets are provided around the cylinders, combustion chambers and valve pockets to prevent the engine from overheating in heavy duty work.

The crank case, which is of close grained iron construction, is divided into upper and lower sections. The upper section is provided with cast webs on the interior which strengthen the case and provide means of mounting the crankshaft and camshaft. The forward extension of the upper section forms the timing gearset case and cover and the rear extension terminates in a closed end which does not include the flywheel housing. The lower section is constructed of cast iron and is fastened to the upper section by small steel studs and nuts. The rear of the lower section forms the oil reservoir and contains the oil screen, which separates the sediment from the oil before entering the oiling system, and the geared oil pump, which is driven from a helically cut gear on the camshaft through a vertical shaft, which connects with the driving shaft of the pump. When the lower section is removed the pump and connecting tubing are left intact with the upper section. A float in the reservoir is connected by a wire with a ball top, which is shown on the outside of the crank case and indicates to the operator the amount of oil in the reservoir at all times.

Crankshaft Unusually Well Proportioned.

The crankshaft, which is of the three-journalled type, is fitted with large bearings and consists of a drop forging made from 35 to 45 per cent. open-hearth steel, heat treated and ground, and having the flywheel flange at the rear cast integral.

The camshaft is drop forged from 20 per cent. carbon open-hearth steel, is 1½ inches in diameter and has the cams and timing gear flange cast integral. The shaft is hardened and ground accurately to size and is carried on three long babbit bearings and may be withdrawn as a unit by removing the timing gearset cover.

The journals of the crankshaft are 2¼ inches in diameter and the cheeks are proportionally heavy and rugged. The

shaft is accurately balanced, both with and without the flywheel on a Norton machine.

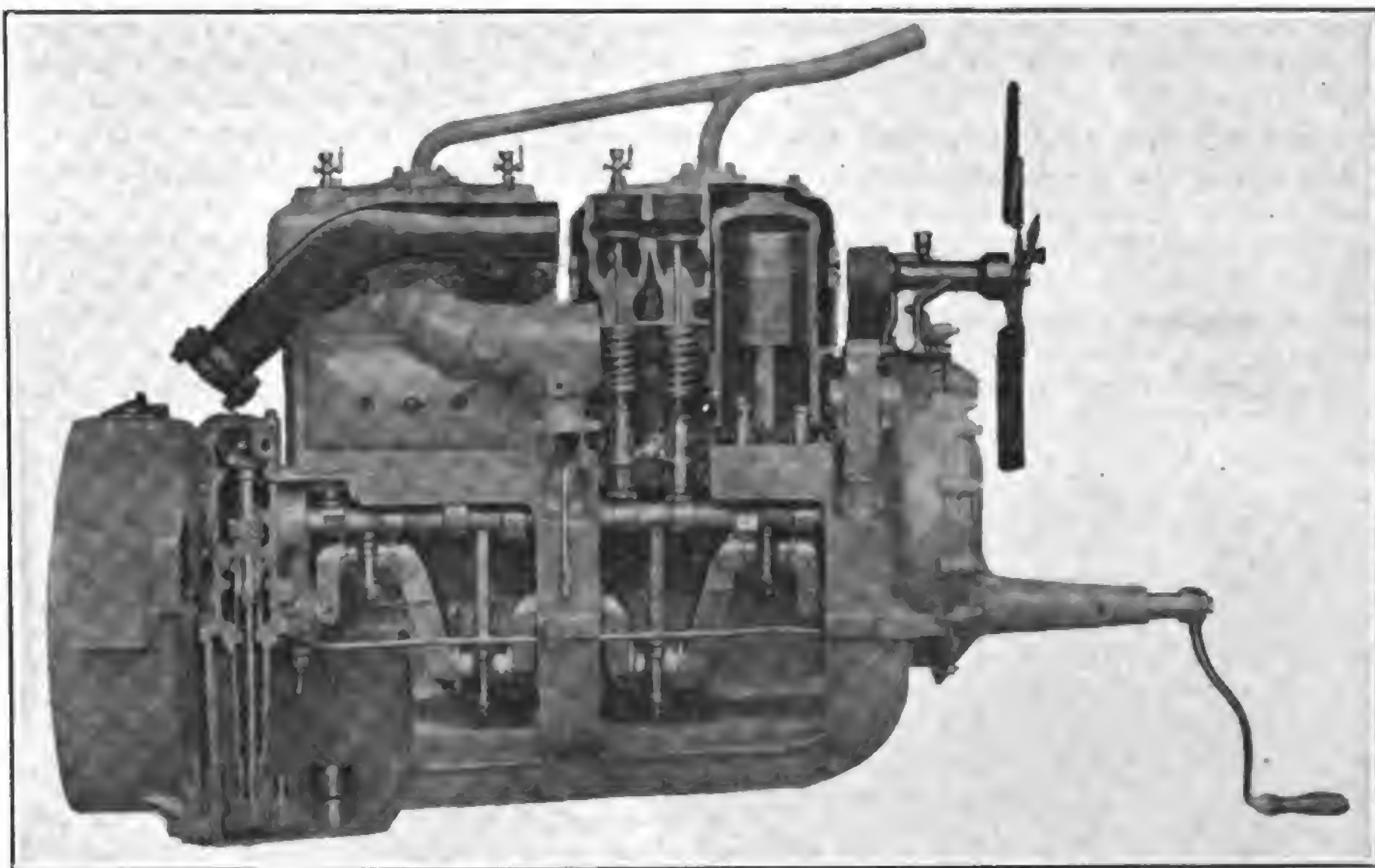
The flywheel housing is cast separate from the crank case and consists of a one-piece casting having the supporting arms cast at the sides, which support the engine in the truck frame and forward extensions at the front of the casting, which are utilized when fastening the casting to the crank case. Reinforced right angle castings are used to fasten the forward extensions of the flywheel housing to the crank case, two stud bolts and four studs and nuts being used to each casting.

Reciprocating Units of the Engine.

The connecting rods are made from drop forgings of high carbon steel, having 12-inch centers, fitted at the crank pin end with bronze shell babbit lined bearings having an internal diameter of 2½ inches and length of 2½ inches. The

ent with good engineering practise without sacrificing strength, are fitted with two rings above the wrist pin, an oil groove at the center which acts as a scraper, and a series of drilled holes, placed equidistant around the groove, which drain the oil collected by the scraper and passes it through the drilled holes to the interior of the piston in such a manner that it supplies the necessary lubrication for the wristpin bushing. Below the wrist pin a series of oil grooves are cut on the piston wall, which conduct the oil to the cylinder walls, supplying sufficient lubrication for the travel of the pistons.

The valve mechanism at the side of the cylinder blocks is covered with side plates that prevent the entrance of dust which would cause abrasive action, and allows full lubrication of the mechanism by a fog of oil from the crank case. Provision is made at the top of the ver-



Sectional View Indiana Heavy Duty Engine.

small or wristpin end of the rod is fitted with a bronze bushing of ample size, which fits the steel pin snugly.

The crank pin bearing cap is fastened with two steel alloy stud bolts, nuts and cotter pins.

Mushroom type valve lifters operate in renewable guides which are kept in position by stirrups, which fit between the guides and are held in place with a bolt and nut fastening. Adjustment of the tappet is by means of a nut and screw at the upper end. The valves are of ample size, having an unusually wide throat opening of 1⅞ inches and lift of 17/32 of an inch. The valve consists of a cast iron head fastened on a carbon steel stem, this type of valve construction having been chosen by the engineers as being best suited for heavy duty engine service.

The valve springs are cylindrical in shape and provide an even tension on the valves, holding them firmly on the valve seats.

The pistons are cast from close grained gray iron, as light as is consist-

tical pump shaft by means of two bevel gears for driving a flexible shaft which operates the Pierce governor, which is attached to the intake manifold of the engine.

The engine is suspended in the truck frame at three points, by means of the two cast arms on the flywheel housing at the rear and by an I beam section, electric steel casting, firmly coupled to a yoke in the center of the case at the front through a steel alloy pin and phosphor bronze bushing. The fan bracket is mounted in the center of the I beam section and swings on a steel pin bronze bushed bearing, which is lubricated by a hard grease cup, while a coiled spring at the end of the bearing supplies the necessary tension to the fan belt. The fan consists of four blades of ample size and is driven by a flat belt from the timing gearset pulley.

The timing gearset is enclosed with a cast iron cover and fastened by steel studs and nuts. The gears are helically cut and operate quietly, while lubrication is supplied from the pump pressure

system in the crank case, the excess pressure of the oiling system discharging into the timing gear case.

Lubrication System Operated by Pressure.

Lubrication of the Indiana heavy duty truck engine is supplied by a pressure of 15 to 20 pounds per square inch from a geared oil pump submerged in the base,

which takes the oil through the oil screen and delivers it under pressure to all the bearings of the engine except those of the wrist pin. The cylinder walls, pistons and wrist pins are lubricated by oil thrown from the connecting rod bearings at the crank pins.

The oil is conducted through tubing to all important bearings on the inside of the crank case, including the crankshaft,

camshaft and through drilled ducts in the crankshaft to the crank pins.

The engine is constructed unusually heavy throughout and amply reinforced at all important points where there is the least possible chance of engine strain, and after three years of use in Indiana motor vehicles the engineers are confident that the engine is eminently satisfactory.

NEW RADIAL TYPE "K" LOADER

JEFFERY MANUFACTURING CO., Columbus, O., a large manufacturer of coal mining machinery, electric locomotives, elevating, conveying and crushing machinery, announces a new Radial type loader which has been especially designed for road contractors and coal yard use where it is necessary to handle large quantities of sand, gravel, crushed stone, ashes, slag, etc., for road building, concrete work and other purposes, as well as the increased storage of coal and coke, which calls for the handling and rehandling of immense quantities of loose materials.

During the time that help was plentiful and cheap the prevailing method was to use a gang of laborers to shovel materials from ground storage to wagons or trucks. However, the constantly increasing cost and acute shortage of labor demanded the substitution of mechanical handling machinery to replace the expensive and laborious "hand shovel" method.

To meet this demand the Jeffery Self-Propelled loader was brought out about 10 years ago, after extensive experiments and tests and careful study of the then existing conditions, being the first machine of its kind to be placed on the market, and in the intervening time has proved a remarkable labor saver and quick handler of materials.

The loader has been used with great success by hundreds of leading concerns, but in order to meet developments in the various industries and the constantly changing conditions, the Jeffery company has developed an improved design known as the Radial loader, which overcomes

all the objections of the old type machine, and is the last word in design and construction.

This new type of loader is made in two sizes to suit capacity requirements and service conditions. The type "K" has a capacity of one cubic yard a minute, while the type "G" has a capacity of 1½ to two cubic yards a minute.

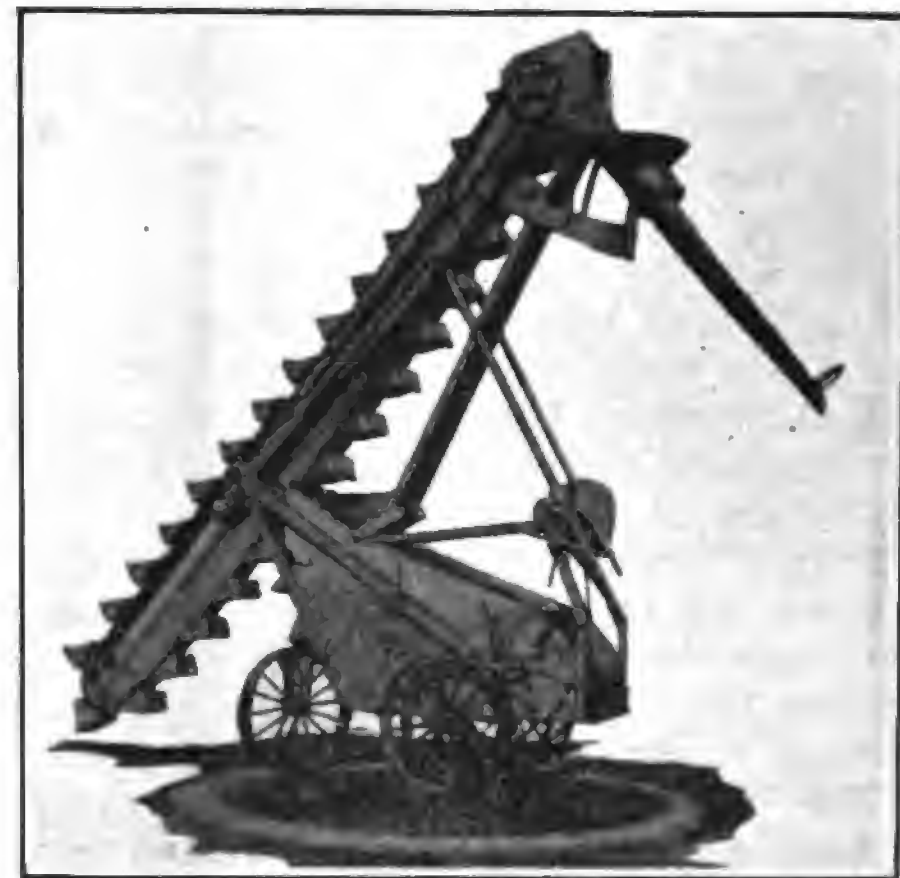
Radial Type Loader Feeds Itself Into Material.

The buckets of the elevator are wider than the elastic boom. This feature, combined with the three-wheel chassis, allows the machine to advance into the material, under its own power, eight to 10 feet without any cleaning up whatever.

There is a great advantage in having the loader feed itself into the material over other methods of hand shoveling or using a special mechanical device to pull the material in front of the buckets. The greatest objection to the old four-wheel type of loader was its inability to feed into the material.

Three-Wheel Construction Used Exclusively.

The three-wheel construction of the Jeffery Radial loader enables the machine to move backward and forward along straight lines into the pile of material. By turning the steering wheel at an acute angle to the driving wheels, the discharge chute will remain practically stationary as to the center of the circle while the pick-up end of the extended elevator boom will travel in a circular path. If the steering wheel is gradually turned through a few degrees either way from the above circular path, the whole



Type "K" Radial Loader Turns in Small Circle.

machine, while cutting from right to left in an arc will gradually move forward into the pile, allowing full range of the machine.

Many Other Advantages of Radial Loader.

The buckets used on both types "K" and "G" are designed for heavy service. The type "G" is equipped with buckets 18 by 12 inches and the type "K" with buckets 14 inches by 10 inches made of heavy malleable iron with renewable digger edge teeth riveted on the front lips and ends of buckets to protect the edges from wear.

Two-Speed Features.

Experiments have shown that a two-speed machine is absolutely essential to obtain the greatest results with the least labor. The Type "K" Radial loader has a fast speed of 60 feet a minute for traveling from pile to pile and a slow speed of four feet a minute for feeding into the material. The Type "G" loader has a fast speed of 40 feet a minute and a slow speed of two feet a minute.

Capacities of Radial Loader.

The capacity of the Type "K" loader is one cubic yard a minute, when loading crushed stone of maximum sized pieces that would pass through a 2½-inch ring in sieve, or maximum sized coal in six-inch lumps.

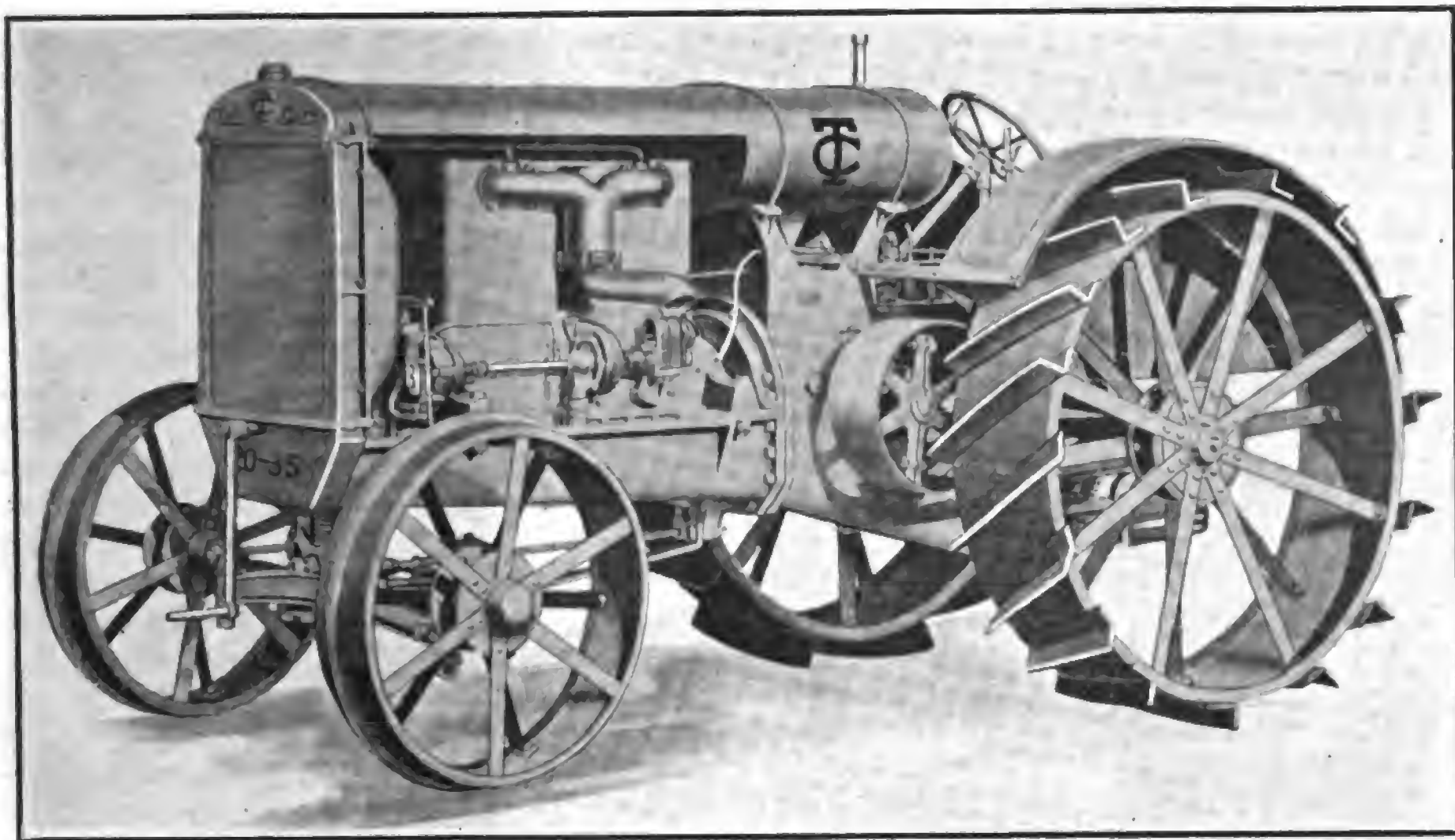
The Type "G" loader has a capacity of 1½ to two cubic yards a minute and will load crushed stone of maximum sized pieces that would pass through a 3½-inch ring in size, or maximum sized coal in eight-inch lumps.

Radial loaders are equipped with either electric motor or gasoline engine and skilled labor is not required for their operation as all controlling levers are in plain sight within easy reach of the operator.



Type "K" Loader Loading Loose Sand from Bank.

LATE TRACTOR MODELS ON MARKET



Twin City 20-35 Tractor, a Five-Plow Outfit.

NEW TWIN-CITY 20-35 TRACTOR.

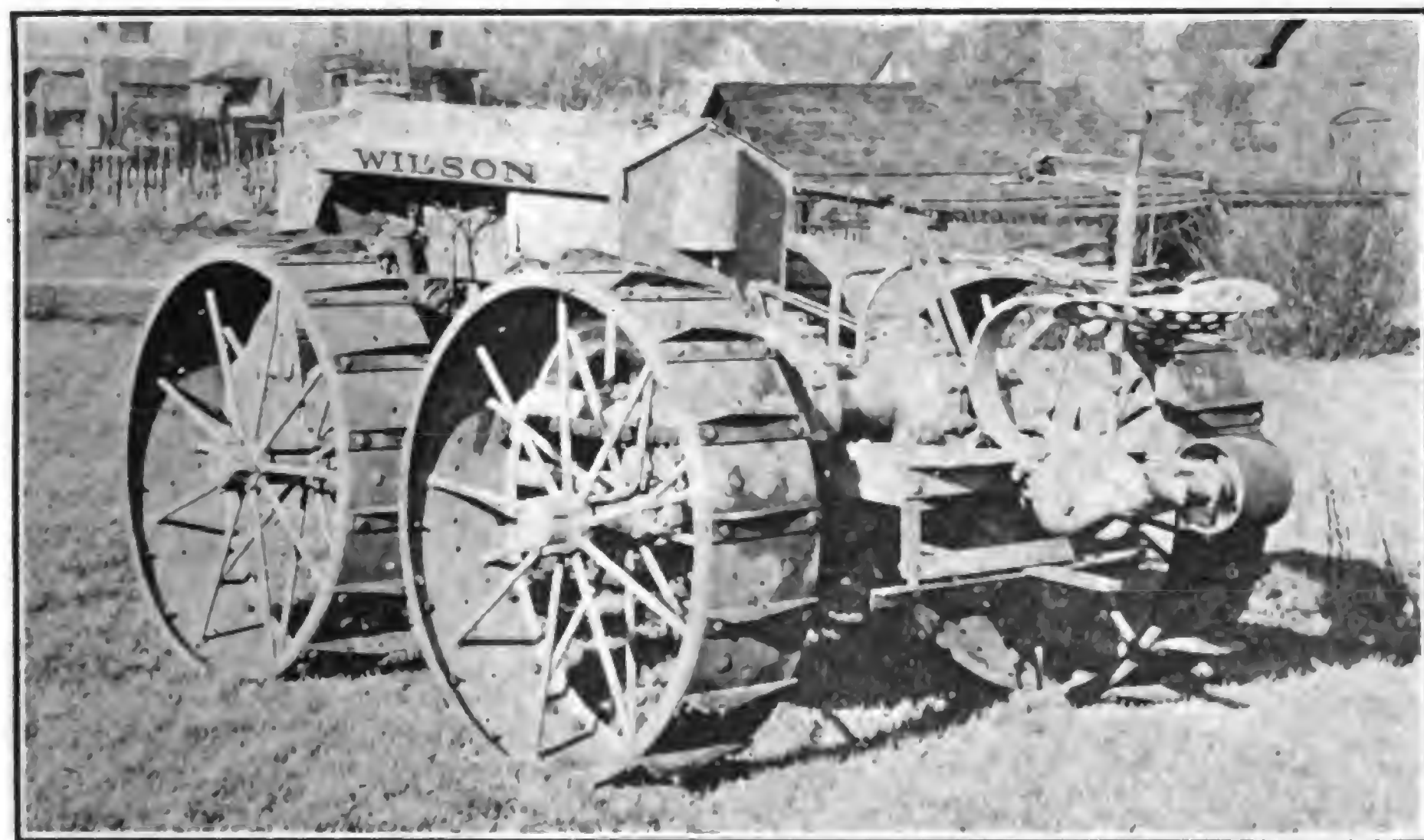
Engine—Twin City.
Bore and Stroke—5½ by 6¾ Inches.
Horsepower—Belt, 35; Draw Bar, 20, at 900 R. P. M.
Cooling—Centrifugal Pump, Spirex Radiator and Belt Driven Fan.
Fuel—Gasoline to Start, Kerosene to Run.
Carburetor—Holly & Bennett Air Cleaner.
Ignition—Bosch High-Tension Magneto.
Lubrication—Force and Splash.
Length, Overall—152 Inches.
Width, Overall—58 inches.
Number of 14-Inch Plows—Five.
Clutch—Dry Plate.
Transmission—Spiral Bevel Gears.
Rear Axle—Own, Fitted with Hyatt Roller Bearings.

FARQUHAR 15-25 TRACTOR.

Engine—Buda.
Bore and Stroke—4½ by Six Inches.
Horsepower—Belt, 25; Draw Bar, 15, at 800 R. P. M.
How Cooled—Pump Circulation and Modine Radiator with Fan.
Fuel—Gasoline to Start, Kerosene to Run.
Carburetor—Kingston with R-W Air Cleaner.
Ignition—K-W High-Tension.
Lubrication—Force and Splash.
Length, Overall—156 Inches.
Width, Overall—67 Inches.
Number of 14-Inch Plows—Three-Four.
Clutch—Plate, Own Make.
Transmission—Own.
Rear Axle—Timken Fitted with Timken Bearings.



Farquhar 15-20 Tractor and Separator Designed Especially for Farmers or Communities Desiring to Thresh Their Own Grain.



Wilson Four-Wheel Drive Tractor Follows Closely Army Tank Construction.

WILSON FOUR-WHEEL DRIVE TRACTOR.

Engine—Weidley, Model "M."
Bore and Stroke—Four by 5½ Inches.
Horsepower—S. A. E. Rating, 25.6.
Cooling—Pump and Perfex Radiator, Cooled by Four-Blade Fan.
Drive—Four Wheels.
Final Drive—Worm and Worm Gear and Chains to Driving Wheels.
Clutch—Wilson, Combination Friction and Mechanical.
Transmission—Planetary Type, Patented.

HAISS "PATH DIGGING" LOADER

GEORGE HAISS MANUFACTURING CO., INC., 141st street and Rider avenue, to Canal place, New York city, is producing an automatic type of truck loader which is meeting with unusual success in the handling of sand, gravel, crushed stone, coal, both anthra-

shaft, extending outward from either side of the bucket elevator, together with a number of heavy steel propeller blades, rigidly fixed to the shaft. The propeller blades are set at four angles around the propeller shaft, and each blade is given a certain amount of pitch, so that in re-

or lowered to suit the loading conditions, and to avoid overhead obstructions when moving.

Propelling Mechanism.

Power is taken from the engine or motor by chain drive to a countershaft, then through a clutch to the jackshaft and from the jackshaft by means of pinions and gears to the traction wheels. The main gear shifter controls one forward and one reverse speed of the loader, allowing the loader to travel backward 60 feet and forward 100 feet a minute. A second or very slow speed gear shifter engages a worm drive, which propels the entire machine backward at a rate of 30 inches a minute, while the feeding propellers churn into the heaped material. The driver wheels have 10-inch faces and are equipped with traction cleats.

The front axle is of similar design to that used on motor trucks, the wheels being steered in a similar manner from the operator's seat.

The chassis is of all-steel construction, which is supported on the three-point principle.

Three heights of chutes are supplied, the "Path Digging" type, which is 8½ feet, the "Hercules Path Digging" type, which is 13½ feet, and the "Super-Hercules" type, which is 16 feet. The loader, equipped with electric motor, weighs 7850 pounds, and with gasoline engine, 8700 pounds.

SELDEN BUSINESS IS GOOD, SAYS FITZGERALD.

The accompanying illustration is part of a delivery by T. P. Fitzgerald, Selden distributor at Ashtabula, O.—2½ and 3½-ton Seldens with dump bodies, the lighter trucks with pneumatic tires. This fleet of six did not supply his orders either, for since then he has taken four more at different times, and has others now on order.

All these trucks were driven overland from the Selden Truck Corporation plant at Rochester to Buffalo, thence over the main market road to Ashtabula. And, by the way, another fleet of 10 Selden trucks helped complete the last stretch of this main market road last fall. It is the highway reaching between Buffalo and Toledo. The contractor, with the aid of his Selden trucks, put in 12 miles of paving in the record time of 92 days.



Loading Sand with "Path Digging" Loader.

cite and bituminous, and other material which may be loaded with a bucket type of loader.

The loader shown in the illustration is handling 500 cubic yards of ashes per day of nine hours, no hand shoveling being necessary, and is loading 10 cubic yard Mack trucks.

The Hais patented truck loader is fitted with self-feeding propellers, which transforms the power propelled truck loader into a path digging, self-loading machine and is being acclaimed unreservedly by mechanical engineers as the ideal truck loader. With this device crushed stone, sand, gravel, hard and soft coal are dug up and discharged into a truck all in one operation. The statement is made that one man and this machine can load five cubic yards of material in five minutes at a power cost of five cents or less, loading the material into the highest truck body.

Hais Loader Digs Its Own Path.

The most important claim for this machine as a labor saver rests on its patented feeding propeller attachment. This mechanism consists of a heavy steel

volving the sweep line of each adjoining blade will overlap that of the next. The propeller blades on the left of the bucket elevator are pitched opposite to the blades on the right; this has a tendency to force the material into line with the buckets, assuring even loading. The bucket is fitted with a saw tooth edge, which facilitates loading and prevents excessive wear to the edges.

In action the Hais path digging feeding propellers sweep out a wide path; they do not, however, secure much material to work in until the very slow reverse speed is thrown into mesh. When this starts to operate the loader crawls steadily backward, pressing the feeding propeller blades gently but firmly against the wide face of the material bank.

The Hais truck loader is mounted on four wheels, the two rear being used as drivers and the front for steering. The loader is powered either with a 10-horsepower electric motor or a 10-horsepower Novo or Ideal gasoline engine. The elevator frame is of truss design and is very rigid in construction. The frame is pivoted in the center, allowing it to be raised



Selden Trucks Ready for Delivery from the Sales Room of T. P. Fitzgerald, Ashtabula, O.

NEW PROFESSION URGED FOR STUDY OF TRANSPORTA- TION PROBLEM

Pointing out the economic advantages of the electric vehicle when used in its proper field and warning against the sale of electrics for service outside this field, Arthur Williams of the New York Edison Co., addressing the annual convention of the National Electric Light Association in Chicago, June 2, urged the establishment of a new profession, "Transportation Engineering," for the purpose of studying and giving unprejudiced advice in all matters pertaining to terminal problems and motor vehicle transportation.

"There is probably no city in the country in which a large part of the business transportation cannot be handled by the electric vehicle with great advantage to the user and to the public," he stated. "Large establishments perhaps require the two types of vehicles—gasoline for long distance deliveries and electrics for local service. Some may find the gasoline alone fitted for their service, while others can accomplish everything with the electric.

"A responsibility now rests upon us to aid in the solution of problems arising out of merchandize transportation through the provision of expert advice to our customers and the public. The information we give should always be intelligent, thorough and never prejudiced as between the gasoline and electric vehicle. Great responsibility rests upon us to maintain this unprejudiced attitude, for any mistake falls heavily upon the consumer.

"In our industry there is an attractive field for the profession of Transportation Engineering. In New York, where such a service is now in course of larger development, every user of transportation may have his entire problem studied, and a chart prepared showing the most effective means of reaching different delivery centers. With such a preliminary study of the conditions involved one may come quickly and intelligently to a conclusion as to which is the best method to employ. It is here that the judgment of the company's expert must be unerring and absolutely unprejudiced. If the gasoline vehicle is best for the particular work the customer should be so informed."

Pointing out the ways in which the lighting companies could help in increasing the use of electrics, Mr. Williams said that first it was necessary for the companies to use electrics themselves, that they should be prepared to give expert advice regarding both mechanical and transportation questions, that they should lend their positions in their communities to the study of terminal and transportation problems, and that they should employ liberal advertising in the local press.

"The question has much to do with the final cost of living," he said in conclusion, "and in aiding its solution we can render conspicuous and desirable public service."

ENLARGED FIELD FOR TRAILERS.

Greatly enlarged truck capacity at slightly increased operating expense is rapidly enlarging the field in which Trailmobiles are being used. There are now designs available for the widest variety of hauling uses, and on all the semi- and four-wheeled types, special bodies, adapted particularly to the requirements of the hauling to be done, can be mounted.

The oil business in the producing fields has become a very large buyer of pole trailers. This is a form of trailer with two wheels attached to the back of a truck by a long pole. It is used for hauling poles, piping and materials that come in long lengths.

Large distributing houses in urban centers are standardizing on semi-trailers for all their hauling. Many of them use twice as many trailers as short wheelbase trucks. They find that the combined economies of double loads with one driver, and of loads put on in the absence of truck and driver so that operation under load is almost continuous, so great that it has paid them to entirely reconstitute their hauling system.

Bodies for these semi-Trailmobiles are built along the lines of the truck bodies that have previously been worked out as especially adapted to the needs of the particular commodity that is to be hauled.

Business farmers who operate large, well organized farms are taking up light Trailmobiles in large numbers. Great advances are being made in the adoption of trailer hauling in every variety of business all over the country.

Without exception dealers who have aggressively sold the Trailmobiles report that as a result of the good record of those already in operation in their territories their prospects for sales during the next year have greatly increased.

It is reported that Japanese in Oregon own 161 motor trucks and 81 automobile.



D. Henry Bonner, Recently Made Sales Manager, Four Wheel Drive Co., Clintonville, Wis.

NATIONAL MOTOR TRUCK COMMITTEE ACTIVITIES FOR YEAR

The fiscal year, ending May 31, 1921, brought to the motor truck section of the automotive industry unprecedented opportunities to stabilize its prestige and to gain a permanent and important position in its economic structure. Over 1,200,000,000 tons of freight were carried by truck; this was greater than the tonnage records of the inland waterways and the interurban trolley lines.

Among the important activities of the committee for the year were:

Standard Truck Cost System—A national standard truck cost system was officially indorsed to provide both manufacturers and operators with a definite perspective and operating cost.

Evils of Overloading—An intensive educational campaign was conducted to call to the attention of dealers and operators the evils of overloading and over-speeding.

New Standards—New standards for body weight allowances, gross weight, body and freight load, and on speeds were adopted.

Chamber of Commerce Campaign—In response to the committee's letters to the chambers of commerce in selected portions of the country over 80 chambers expressed their willingness to cooperate in the stabilization of transportation matters.

Farm Market Survey—Through the co-operation of the directors of agricultural extension and marketing work in the various states an intensive survey was carried out to find out the extensiveness of the utilization of the motor truck on the farm.

Rural Motor Transportation—In view of the crucial condition of the farmer in this country the committee, cooperation with the American Farm Bureau Federation, arranged for the formation of state committees to encourage and intensify rural motor transportation.

Proper Lubrication—An educational campaign was conducted among truck users to emphasize the necessity of proper lubrication in the motors.

Motor Bus Service—Definite assistance was given to over 50 municipalities in the development of motor bus service. Special efforts have been made for the purposes of this work to keep on file the most authoritative figures on operating costs and the most permanent features of the bus companies already developed in this country.

NEW DISTRIBUTOR FOR ARMLEDER TRUCKS.

The Armleder Truck Sales Corporation, 2133-2157 Columbus road, Cleveland, O., has been appointed a distributor for the complete line of Armleder motor trucks. The executives of this concern are: President, Charles A. Sirl; vice president, Frank E. Meyer; secretary and treasurer, Theo. J. Sunkle. Fred C. Evers will be in charge of sales.

MOTOR OMNIBUS FOR RAIL OPERATION

RAILROAD officials, particularly those executives who are more or less concerned about making branch steam lines more of a success financially, will be interested in the possibilities in this direction offered by the gasoline driven motor omnibus and trailer illustrated built by the J. G. Brill Co. This substitute for the steam locomotive and coach on branch or short main lines is recommended by its builders because of the apparent low cost of operation, not to speak of the comparatively low initial cost. Its possibilities are so great that a most thorough investigation is warranted by interested railroad officials; in some cases a revision of schedules to provide more service has shown surprising results in the way of a larger number of passengers carried and increased gross revenue.

Cost of Operation Low.

As to its cost of operation per mile, it is sufficient to say that it claimed to be so low as to excite the interest of most railroad officials whose lines can use equipment of this character to advantage. Actual figures compiled by one railroad are of little value to others, due principally to the wide divergence of operating conditions and for this reason it was considered advisable not to attempt to present any in connection with the cost of operation of this gasoline rail car and trailer. It is evident, however, that where the excessively high operating cost of the steam locomotive and coach makes the continuation of service almost prohibitive, the substitution of this gasoline rail car will not only permit the same service at less cost, but offers an opportunity to improve both the service and earnings. Provision may be made for the handling of baggage and express either in conjunction with the motor car or on a special trailer designed for the purpose.

With this type of vehicle a maximum speed of 30 miles an hour may be obtained, and when required the trailer will carry a load at least equal to the load of the motor car without materially decreasing the speed of the latter. So much for what it does. Let's see what it consists of.

In the first place its chassis is equipped with flanged rear wheels for rail service and the front end is mounted on a spe-

cially designed pony truck. This pony truck adheres better to the rails under high rates of speed especially on curves and consequently comfortable riding action results.

A typical single motor car was built for the Chesapeake Western railroad, a 40-mile line operating between Elkton and Stokesville, Va., and is mounted on a 2½-ton Mack chassis of the International Motor Co., having four transmission speeds, both forward and reverse. In addition to the system of brakes on the small pony front truck, which is controlled through the shaft and wheel used for steering in regular motor bus practise, the speed of the bus is also retarded by the application of brakes on the rear wheels and also on the transmission. Convenient to the operator's position there is a foot pedal, which controls the operation of the rear wheel brakes, and to his right there is a lever which applies the transmission brake.

Body Constructed to Meet Sanitary Requirements.

The body was constructed according to the best body building practise, with a composite underframe of ash side and end sills and crossings of three-inch steel channels, ash corner and side posts in the superstructure, with No. 18 sheet steel side sheathing up to the belt rail.

It measures 21 feet 11 inches long over corner posts, seven feet 10½ inches wide over side posts at belt rail and has a seating capacity of 31 passengers. Eight standard Brill light weight "Waylo" stationary seats, two side longitudinal seats for four passengers each, a long seat extending completely across the rear end for six passengers and one single corner longitudinal seat, all upholstered in Brill twill woven seating rattan, constitute the available seating space for passengers.

The interior is of a sanitary ash finish with roof car lines showing, and in appearance greatly resembles the electric street car, the seats, floor mat strips, ventilators, hand straps attached to ceiling and many other details conforming to the equipment and construction characteristics of that type of vehicle. All side and end windows are of the double type, the upper part being stationary and the lower arranged to drop into pockets. The front is enclosed with a windshield, which is hinged and opens outwardly.



Showing Seating Arrangement of Omnibus and Trailer; Sanitary Conditions Prevail Wherever Possible.

The two-leaf folding doors, which enclose the door opening on each side of the forward end, are controlled by manually operated levers located in front of the operator's position, a separate lever being used for each set of doors.

As in regular motor omnibus practise the heating of the motor car is through the exhaust from the engine.

The roof is of the plain arch type and contains three standard Brill "exhaust" ventilators. This ventilator will be recognized as that type which has been pretty generally used in electric street cars and which through years of service has been found capable of quickly removing the impure air without subjecting the passengers to draughts.

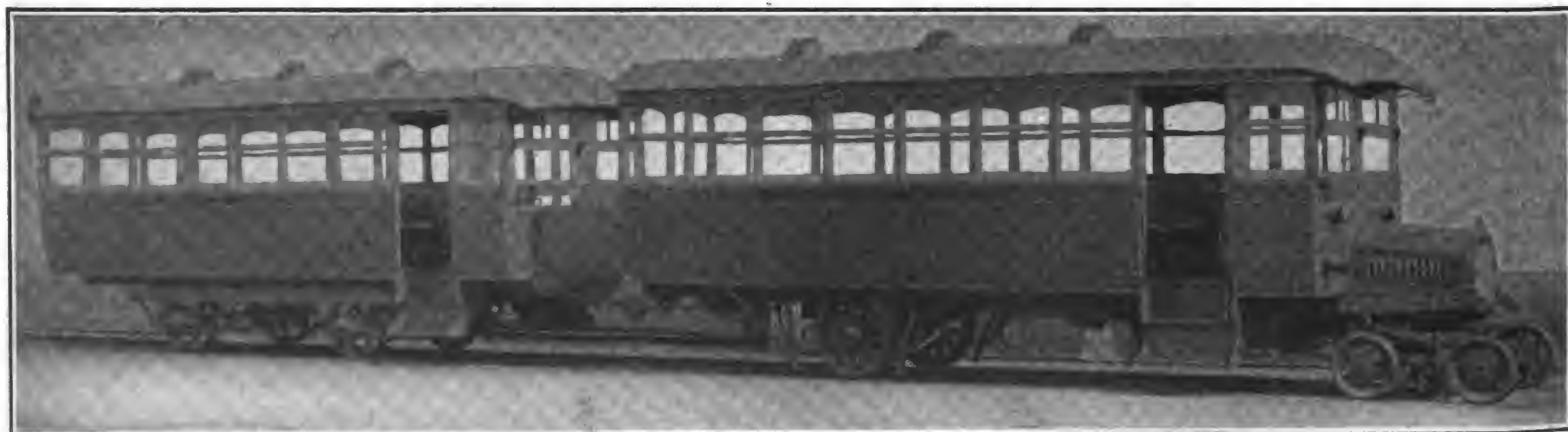
Under the rear end, strapped to the bottom of the underframe, is a large wooden box with hinged cover and lock for the hauling of luggage.

Pony Truck Displaces Front Wheels.

The small pivotal pony truck under the forward end is constructed of commercial steel shapes and has a three-foot wheelbase. It is equipped with 20-inch diameter wheels having MCB standard width tread and thickness of flange. The distance between the rear axle and center of this pony truck is 16 feet six inches. A pilot is attached to the front end of the chassis as a safeguard against obstructions on the rails which might cause derailment.

A motor and trailer constructed for the United States engineers for operation at Camp A. A. Humphrey, Va., is illustrated. The motor bus is practically the same as heretofore described with the baggage box and front pilot eliminated, and the trailer is of the same dimensions and

(Continued on Page 319.)



Brill Gasoline Motor Driven Omnibus and Trailer Designed for Rail Service, Where It Is Not Profitable to Use Regulation Steam Driven Trains.

MOTOR TRANSPORT GAINS MANY ADVANTAGES BY USE OF TERMINALS

Another advance in the progress of motor transport is charted by the Firestone Ship by Truck Bureau, Akron, O., in a bulletin dealing with "The Motor Truck Terminal."

This bulletin tells how to organize truck terminals, defines the length of the "short haul," cites examples of terminal operation and shows how trucking through terminals adds to the efficiency of motor transportation.

Both the public and the commercial hauler gains by the operation of truck terminals, says the bulletin. In addition to expediting the movement of freight, a truck terminal gives the shipper a receipt for his goods from a corporation of unquestioned responsibility, and assures the shipper that cargo insurance will be carried on his merchandise. The principal advantage to operators may be summed up in increased efficiency, which brings to motor trucking the same orderly processes that mark other established lines of transportation.

"It is not to be expected that the motor trucking industry can attain maximum efficiency while composed of a multitude of individual operators, with resultant large duplication of effort," says the bulletin. "Recognizing this fact," it continues, "many of the most progressive men in the motor trucking industry are interesting themselves in the organization and conduct of motor truck terminals."

Advantages of Cargo Insurance.

Speaking of the advantages of cargo insurance, the bulletin says:

"In the past, in dealing with individual operators the shipper either has had to take the time to hunt up the more or less rare operators who carry insurance, or take a chance. The fact that many shippers have refused to take either of these alternatives has been a great factor in limiting the tonnage available."

Terminal advantages include, according to the bulletin, a known and accessible place to deliver and receive merchandise, a published tariff, scheduled routes, insurance, responsibility, receipt for goods, increased speed in delivery, improved, and in many instances, cheaper service.

The bulletin discusses the principal terminal functions, the field for terminals, types, details of organization and operation and the scope of terminals as an industry in itself.

One chapter discusses terminal co-operation between cities. Terminals in neighboring cities not more than 200 miles apart should actively cooperate with each other, it is claimed. This would greatly increase the volume of tonnage handled, by popularizing motor transportation for less than car lot shipments and fragile and perishable commodities.

Iowa boasts of a farmer, Elmer C. Ketcham, who farms a quarter section without using a single horse.



Joseph Husson, General Sales and Advertising Manager of Northway Motors.

NEW NORTHWAY SALES ORGANIZATION.

Coincident with the placing of 50 new Northway salesmen in the field on June 1, the Northway Motors Sales Co. will begin an active truck merchandising campaign in the territory covered by its 13 factory branches in New England and in the states of New York, New Jersey, Pennsylvania and Maryland. For the carrying out of this new sales policy, President James F. Cavanaugh has gathered around him a staff of men of long experience in the sales, service and advertising phases of the motor truck industry.

These men include Joseph Husson, general sales and advertising manager, who for the past eight years has been editor of the Commercial Vehicle and has had ripe experience in the automotive field.

W. E. Downs is assistant general sales manager and a man of wide experience in truck merchandising. More recently he was New England sales manager for a prominent make of motor truck and later New England distributor for a prominent make of passenger car.

H. F. Flugge for 14 years connected with the Locomobile company in service work, both at the Bridgeport factory and at the New York branch, is general service manager, assisted by F. L. Ortle who, for the past eight years has been service engineer for the Metropolitan Coal Co., Boston, owning a fleet of over 100 motor trucks, said to be the largest fleet of trucks operating in any one city in all of New England. Previous to that connection he was with Murray & Tregurtha, manufacturer of marine engines.

C. P. Williams remains in charge of certain service work with Albert Rice in charge of the delivery department, and J. H. Reilly as head of the body department.

R. B. Sill remains as branch sales manager and H. W. Pierce as manager of dealer sales. Richard A. Magee is in direct charge of the advertising.

EASY AND EXPEDITIOUS METHOD OF HANDLING BIG TRUCK TIRES

The apparent ease and dispatch with which a thoroughly experienced driver can dismount and apply without assistance big pneumatic truck tires is evidence that there is a knack to it that is worth the attention of those who own or operate trucks.

In the following paragraphs the United States Tire Co. points out briefly how the handling of these tires can be made a one-man job.

To dismount the tire and rim from the wheel, jack up the wheel until the tire freely clears the ground, loosen the tire bolts and then the rim, by shock, and turn the wheel so that the sector containing the valve is near the ground. With both hands grasp the tire and rim at points just below the level of the hub, and quickly lift and pull the rim away from the top of the wheel. At the same time watch the valve to make sure that it does not bind in the felloe, when the rim slides off the felloe band.

If properly performed this method of dismounting the tire and rim from the wheel requires very little lifting and causes no damage to the valve or the tube at the valve base.

To detach the tire from the rim, lay the tire on level ground, locking ring side up, remove the valve plunger to complete deflation, and push back the valve stem inside the rim. Remove locking and side rings loosen flap all around and, standing inside of the rim, lift the tire straight up off the rim.

When the tire is ready for replacement on the rim, reverse the operation of detaching the tire from the rim with the tube flap in place and valve stem pushed back flush with the base of the flap, drop the tire carefully over the rim, taking care that the base of the valve stem is directly opposite the rim valve pole. Step down the tire on the rim all around by treading on the bead, apply side and locking rings, draw out the valve stem to the proper position and inflate.

Finally, in applying the rim and tire to the wheel, engage the valve stem in the felloe at a point level with the hub, push the rim firmly against the felloe and slowly turn the tire, rim and wheel until the valve is at the highest possible point. The rim will drop into place on the felloe except at the bottom, where it can be pushed on by the foot.

This knack of first engaging the valve, then turning the tire and rim on the wheel eliminates all direct lifting, and makes the applying of an eight-inch tire, the largest perfected truck pneumatic, a one-man job.

ARMSTRONG IN NEW FIELD.

W. A. Armstrong, 965 Woodward avenue, Detroit, Mich., has been named as Michigan representative for the Breeze Metal Hose and Manufacturing Co., Newark, N. J. The company handles flexible tubing.

IS YOUR MOTOR TRUCK READY FOR UNINTERRUPTED SUM- MER SERVICE?

The sweltering days of summer will soon be with us and service stations will again be filled with heat-afflicted motor trucks. Will your truck be in the steaming radiator line? Or is it prepared to give uninterrupted service during the summer months?

Overheating and other common hot weather troubles are usually due to lack of forethought and to mistakes that can be easily avoided. The main points which require attention are briefly outlined below by A. F. Masury, chief engineer of the International Motor Co., manufacturer of Mack trucks.

1—Do you understand the truck's cooling system thoroughly? If not, now is the time to go over it carefully and find out all there is to know about it. See that the flow of water is not impeded by any sort of obstruction and that the overflow pipe is not bent below the level of the base of the radiator filler. Be sure that the overflow pipe is not clogged or flattened.

2—Is the radiator clean? The front of the radiator should be free from dirt, license plates and signs. Also, the back of the radiator should be unobstructed so that nothing will impede the circulation of the air.

3—Are the hose connections water tight and is the hose in good condition? Be sure that the rubber has not been affected during the winter by an anti-freeze solution. Only the best quality rubber hose should be used, as the inside tubing of cheap hose is easily worn away and the rubber particles carried along with the water clog up the radiator.

4—Does the fan turn freely and is the belt tension right? The fan should be clean and its bearings should be well greased. A good test is to turn the fan by hand with the engine shut off. If it is possible to slip the belt easily, but not possible to spin the fan, the tension is right.

5—Is the carburetor choke in proper repair so that it opens all the way? Better open the seasonal shutter on the hot air tube. Is the float level correct? If too high, slight flooding will cause an over-rich mixture.

6—Does the ignition system furnish a spark of sufficient strength? A weak spark, due to excessive lubrication of the magneto, dirty breaker or distributor, or weak magnets, will have an effect similar to late spark timing and overheating will result.

7—Are the valve tappets properly adjusted? They should have from .008 to .010-inch clearance, which may be gauged by about the thickness of an ordinary post card.

8—Are the cylinders free from carbon? If not, remove it.

9—Is the oil in the crank case clean? Gasoline, dirt or other foreign substances will impair the quality of the oil in the crank case, resulting in overheated parts, due to insufficient lubrication. The oil

reservoir should be drained every 1500 miles, the walls thoroughly cleaned and a fresh supply of oil should then be put into the crank case.

10—Are you using the right grade of oil? Because of the increased temperatures it is often advisable in summer to use a heavier grade of oil than in winter.

11—Are the exhaust pipe and muffler clean? Practically 40 per cent. of the heat of combustion escapes through the exhaust. It follows, therefore, that if any part of the exhaust system is obstructed, a part of this heat must be carried off by the cooling water, which will naturally raise its temperature.

12—Are the brakes free? A dragging break will cause overheating in hot weather that might not occur in cool weather.



"If you want to hear the plain and fancy lyin' champion of America when he's working right, just drop down to the office some time when this new fellow we hired gets hold of a live prospect. He's the nearest to being a blood-brother of Old Man Nothing we ever had work for us," said O. M. Vett as we were talking one afternoon.

I thought of his words as I sat in his office a few days later awaiting his arrival and heard a raucous voice declaiming—that's the word that expresses it best—

"This car has the speed of a shooting star, the quick, snappy acceleration of an airplane, the durability of the universe, the strength of an elephant and the silence of death."

At this juncture, as I sat wondering how in the world he managed to get away with such a line of "bunk," Vett walked in. He too remembered our previous conversation and grinned knowingly as he removed his hat and wiped his perspiring forehead. "Heard him as I was passing by the front door," he commented.

"That bird'll say anything under the light of the sun when he is really camping on the trail of a prospect. He don't think no more of promising free tires than the average man would of promising free air.

"New parts and new motors—10-year guarantees or anything that he happens to think of goes all right with him. He tosses 'em around as free as a bridal party would confetti. Between ourselves he wouldn't stay here a minute if I had my way, but he's related to the boss' wife and that lets him out—or rather it keeps him in.

"He don't know the meaning of time. Let a machine break down 10 miles away and he'll promise to be there in five minutes with a service car and a basketful of free service. He's one of them kind that when the repeat order goes somewhere else blames it on poor service. That alibi's a lullaby and I've heard it so often that I go to sleep to the tune of it.

"No sir—his sort of stuff don't go any more. The salesman has a definite task to perform. The whole 'market' has changed and the successful salesman will be the honest intentioned man who makes a conservative, concentrated, vigorous, fight for business. The oft repeated maxim that 'brains are superior to bull,' was never more true than today, and never needed more stress placed on it. Good salesmen have good judgment and good reasoning power. They make correct decisions. They are thinkers. It is only the bluffer who lets lying promises and knocks take the place of substantial arguments. He does this because he hasn't the intelligence to combat the customer's indecision in any other manner—now listen at that fathead ramble on will you—" he concluded disgustedly.

The voice from the salesroom floor was still talking in what appeared to be an uninterrupted flow—"The 'Bango' car? For Goddlemity sake, don't you never, so long as you live, buy that piece of junk. It's only a wheelbarrow with a canoe power engine in it. I don't care if you have got one now—they ain't any good. You showed poor judgment when you bought it. Now our car is ———"

TRUCK DRIVER HAS VEST POCKET KITCHEN.

Every calling has its type and the long distance auto truck clan is no exception to the rule. The rank and file are constitutionally long and rangy fellows, hard weather men of the well known, two-fisted, short-tempered variety. The sleek, well fed, sunny natured truck captain is an anomaly seldom seen. Consequently when "Smiling Sweeney" refused to develop angularity of body and disposition after several months on a long distance auto truck his boss demanded to know the secret.

Sweeney attributed this to the regularity and equality of his roadside repasts. "It's easy," he says. "These lean guys are skinny because they starve. Sure, they eat, but they eat cold snacks on the road or wait till they get to some regular eating house and then fill up on 'grub.' I take a gas hot plate along and when I get hungry I put up on the roadside. hook up my little pocket stove to a 'Polly' tank, and presto, I have a hot meal fit for anybody." It should perhaps be explained that "Polly" is a highway nickname for Prest-O-Lite and applies specifically to the Prest-O-Lite acetylene tank which, owing to its dependability on the roughest roads, is now regarded as indispensable for the cross country motor fleet. Incidentally, the gas hot plate is also a Prest-O-Lite product.

The boss says the time spent in preparing the roadside meals will be more than made up on the run by the improved condition of the men.

RURAL SCHOOLS SERVED BY MOTOR BUSSES

The "little red schoolhouses" that our fathers knew are fast disappearing from the country districts and in their stead is seen the consolidated schools, which, centered as they are, give to the country children of this day practically all of the advantages of his city cousin who attends the city schools, studying the same studies, under highly trained teachers and ideal conditions.

The consolidated school has been developed to serve country sections wholly, and the children who attend are drawn from a district covering a radius of a number of miles. There has been considerable agitation among the parents of children residing somewhat remote from the centers, because it was necessary for them to arise early in the morning to meet the conveyance that carried them to the school. Horse drawn vehicles were used for this purpose during the first few years after the developing of the consolidated school, but the drivers and owners of these vehicles are fast turning to the use of the motor truck, displacing the horses, transporting the pupils in quicker time and by the use of specially constructed bodies of the enclosed type, protecting the children from the elements and keeping them warm in winter by the heat from the exhaust from the engine. Glass windows are placed along the sides of these busses, which can be opened in summer and closed in winter. A hinged door at the rear provides entrance and egress, while a hinged step allows the children to enter and leave the bus with safety. Side seats, covered with rattan laid over padded coiled springs with lazy backs also upholstered in rattan afford a degree of comfort. Bus bodies of this type, constructed especially for school work, are equipped similar to those used in the larger cities for carrying passengers, with the exception that the seats are lower for the children.

The size of the bus depends upon the number of children to be carried. Many Ford one-ton trucks are used for this purpose, while $\frac{3}{4}$ -ton to $1\frac{1}{2}$ -ton trucks of various other makes are also used. Trucks similar to the Ford, Reo, Stewart and Republic, of $\frac{3}{4}$ to one-ton capacity, have a carrying capacity of from 16 to 20 children without crowding, while the larger $1\frac{1}{2}$ -ton trucks will carry 30 or 35 children without crowding, depending upon the type of body used and the seating arrangement.

Consolidated Schools Increasing Rapidly.

According to available statistics at the beginning of 1920 there were about 13,000 consolidated schools in the country and 212,000 one-room schools, which should provide a field for about 40,000 more consolidations. It is believed that 14,000 is a conservative estimate of the consolidated schools now in operation and that there are 3000 to 4000 more in prospect. Pennsylvania alone is working on 200 consolidated projects.

Educators are becoming intensely interested in consolidation. It means a rise in the standard of teacher personnel and pay, a subject that is being agitated

throughout the country. Many institutions of higher education, such as Kentucky State university and Kansas State Agricultural college, are now including the subject of consolidated schools in their extension courses. Women's clubs are also interesting themselves in consolidation campaigns. The United States Department of the Interior is assisting in the consolidation movement and has the cooperation of the Department of Agriculture through its county agricultural agents.

Transportation of Children Solved by Trucks.

What is of the utmost interest in this connection is the question of transportation. Many miles must be travelled daily by vehicles in picking up and delivering the children at their homes. The vehicle that can do this work in the quickest time and with the greatest economy, all things considered, is the proper vehicle to use for the work. The motor truck, with its sturdy construction and flexible, powerful engine, at present has reached a high degree of perfection and equipped with a bus body of late design seems to

outings through the surrounding country. Motor Busses Satisfactory in Many Sections.

The following quotation from a letter received from the director of the Bureau of Rural Education, Pennsylvania Department of Public Instruction, states that "hundreds and thousands of places are finding that the motor car can be operated where it used to be considered impossible. They are also finding that it is cheaper when service is considered. Many communities have not purchased horse drawn vehicles for two or three years and are relying wholly upon the motor bus. In Pennsylvania more motor busses are being used than horse drawn vehicles."

A county superintendent in Ohio reports that last year they had in service 20 automobile busses and this year they were increased to 60 and probably will be completely motorized within a short time.

Cuyahoga county, Ohio, reports that no more horse drawn vehicles will be purchased. Montezuma county, Kansas, expects to be completely consolidated this



Type of Cross Seat Bus Fitted with Individual Doors for Each Cross Seat.

solve the problem. Again the country districts are fast being supplied with good roads, thanks to the general use of the automobile and truck by the farmers, and this makes for rapid transportation.

The bus drivers are paid by the town or city employing them a wage that is based on a contract for the year, and the amount varies with the average number of children carried daily, ranging from \$50 to \$100 a month. This work is usually undertaken by some farmer or a resident of the town where the school is located. It takes only an hour or two to make the trips to the school morning and night, leaving him the balance of the day to perform his regular work about the farm. Thus it will be seen that this pay is really clear velvet for him outside of the small expense required to operate the truck.

As the bus body is mounted on a truck chassis, of course the use of the truck for other work is prevented, making the operation of the truck more expensive than if it could be used for other work during the day. There is often during the summer months, however, opportunity to take excursion or picnic parties on

year, with six schools, using 50 busses, serving the whole county. The State of Washington reports that motor busses are the principle means of transportation and the State of North Carolina reports that there they are displacing horse drawn vehicles.

Massachusetts Recommends Motor Busses.

In Massachusetts half of the children for whom transportation is provided are carried on electric and steam roads, the remainder by motor busses or horse drawn conveyances. If the Massachusetts percentage holds true for the country as a whole there are approximately 18,000 motor busses and as many horse drawn conveyances used in school transportation. This assumes that the 13,000 consolidated schools in the country have a conservative average of 150 to 180 pupils carried per school.

Most of the 18,000 or more horse drawn vehicles can profitably be replaced by motor trucks equipped with bus bodies, except in certain sections where poor roads are a barrier to motor truck use.

"The motor bus is fast replacing the horse drawn vehicles because of its su-



Seating Arrangement Side Seat School Bus, Showing Comforts Provided for the Children.

periority in regularity, speed and general comfort," says Bulletin No. 115, Massachusetts Department of Education.

"On the whole, transportation by motor bus is found to be somewhat less expensive than by horse drawn vehicles," says the same authority, giving figures.

Much more of the business of supplying motor transportation to schools, however, will be available in the case of new consolidations.

The following partial list, compiled from the latest available data, gives an idea of the extent of the movement:

State	No of Schools Consolidated
Indiana	1,002
Ohio	913
North Dakota.....	516
Iowa	380
Massachusetts	333
Minnesota	302
West Virginia.....	171
Missouri	150
Kansas	140
South Dakota.....	140
Colorado	114
Kentucky	80
Nebraska	61

Local Dealers Can Aid Movement.

Local dealers can help both their communities and their own business by standing for the consolidated school movement in the rural districts of their territory. The United States Bureau of Education and other leading educational authorities recommend consolidated schools, which means better buildings, better paid teachers and consequent better instruction for the children than the one-room schools can afford.

The relation of good roads and the automobile to education is briefly and forcibly stated by United States Commissioner of Education P. P. Claxton as follows:

"If there were more good roads and more auto busses in our rural counties, the consolidation of schools could go on apace with a reduction of 50 to 80 per cent. in the number of schoolhouses. One-third of one-room teachers could be dis-

missed and better paid consolidated teacher."

Official Suggestions on School Bus Needs.

J. C. Muerman of the United States Bureau of Education, Washington, has prepared the following suggestions on body styles and service instructions. These suggestions are based on hundreds of inquiries and recommendations from schools all over the country.

Bodies.

Top ventilators are desirable.

It is preferable to have the driver's seat in the same compartment as the passengers, so he can keep control of the children.

As much weight as possible needed on front wheels; present tendency is for larger school busses having too much weight on the rear wheels.

Two exits important, in case of fire, capsizing or stalling in snow drifts.

Where four rows of seats, running lengthwise of the bus, are provided, there should be ample aisle space, using maximum possible width of body.

If not too expensive, removable khaki upholstery over leather or leatherette would be preferable to plain leather

usually used, as the khaki could be removed and washed.

Service Suggestions.

Seller should provide adequate service instructions.

Minimum garage equipment for minor repairs should be stated.

Definite arrangements should be made for service station work.

Statement needed of how long paint should stand up, and what grade of paint is needed for repainting.

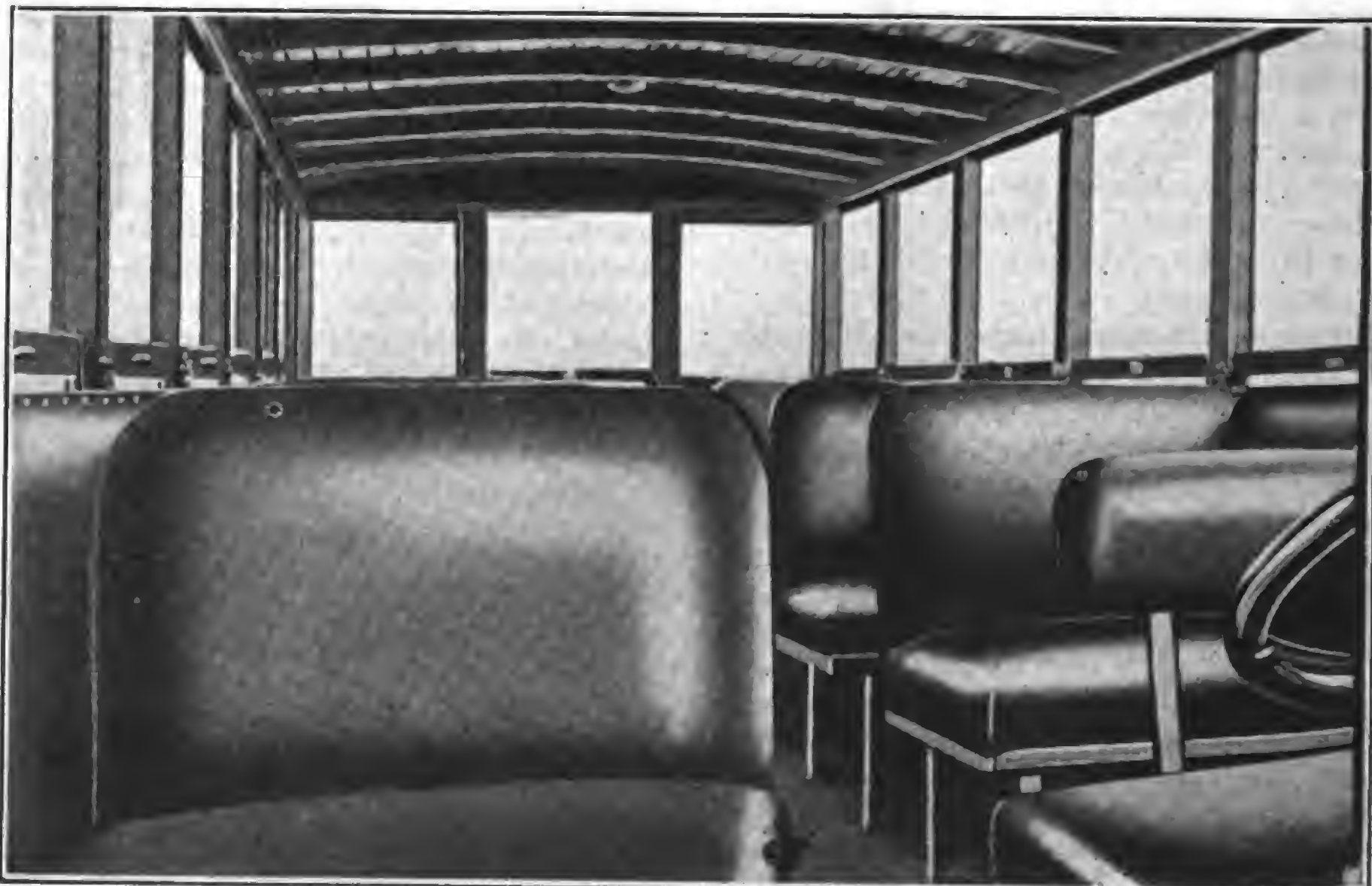
Transportation by Motor Bus and Horse Drawn Vehicles Compared.

A compilation of the records of various schools representing all sections of the country shows an average transportation cost of 1.8 cents per child by motor bus and three cents by horse drawn vehicles. Still assuming that the bus is capable of double the time mileage possible by horse, and assuming districts of a maximum size of one transportation hour, the cost of transporting the average pupil will be 20 per cent. greater by bus than by horse drawn vehicle. Transportation cost amounts to about 10 to 15 per cent. of the total cost of tuition. Therefore, under the most unfavorable circumstances the use of motor busses will increase the unit cost of tuition about three per cent., but at the same time it offers the compensating advantage of a district of quadrupled area, greatly increasing the possibilities of economies in other directions. For instance, doubling the investment in the school plant should be more than sufficient to give equal advantages to four times the number of pupils, thus reducing the amount of taxes necessary by 50 per cent.

Improvements in Bus Equipment.

Taking up the subject of bus equipment, many improvements have been made during 1920. Several manufacturers of trucks and bodies have given the school bus special attention, with the result that there are now on the market several standardized busses, providing maximum value, seating capacity and comfort at minimum cost. While it is important that each installation be studied as a separate problem, the general tendencies in chassis and body construction should be noted.

Where replacement equipment is be-



Cross Seat Bus with Wide Aisle Between Seats, Children Ride Facing the Front.

ing purchased, the tendency is to get away from the light chassis and use those of larger capacity, the 1½-ton chassis being the most popular. This is an important and apparently well founded development from the standpoint of safety as well as economy.

Bodies may be divided roughly into two classes: The side seater and the cross seater. The side seater gives less comfort and seating capacity. A recent development of the side seater has an extra seat down the center, accommodating three rows of children lengthwise of the bus. This gives added seating capacity, but is not all that could be desired so far as comfort is concerned and is rather unsafe unless a rear door is provided which, in turn, reduces the capacity. The cross seater is of two general types, one having individual side entrances and the other with an aisle down the center and having rear and front doors. Considering seating capacity, comfort and safety in their relative importance, it is believed that the last mentioned type is the best for the average installation.

The dependence of consolidated schools on motor transportation has been emphasized. In conclusion it should be stated that the motor bus is also dependent on, and greatly limited by, a very important factor. From all over the country come reports substantially the same as that contained in a recent letter from J. C. Muerman, specialist in rural education, Department of the Interior. Mr. Muerman says:

"Until we have a better system of roads and more money available for roads, I do not look to see the consolidated schools advance as rapidly as they will when the good roads problem is settled."

THOMART CO. ANNOUNCES 25 PER CENT, REDUCTION.

The Thomart Motor Co., builder of the Akron Multi-Truck, announces a reduction of \$690 in the price of the Akron Multi-Truck chassis, making the present price \$1995 f. o. b. Kent, O. The occasion for this reduction is concisely outlined in statements given out by W. G. Thompson, president, and J. L. Stewart, vice president and general manager.

"We have been very carefully watching the trend of prices covering both material and labor and have for some time felt that production costs could be very materially lowered. With this thought in mind we have carefully refrained from piling up any inventory other than that actually required by our production schedule, and as a result when the anticipated price reduction materialized we were in a position to give the truck operator the full benefit of our lowered costs by an immediate proportionate reduction in list price.

"The Akron Multi-Truck is now upon a strictly up-to-date price basis and we have avoided giving rise to that uncertainty in the minds of our dealers and distributors inevitable if this reduction had been made piece meal instead of in one generous cut. The Akron Multi-Truck chassis was offered to the pub-

lic as the most completely equipped truck chassis on the market, the equipment including every detail essential to the comfort and convenience of the operator and being such as to insure the truck mechanism against neglect on account of difficulty of access or adjustment. Not a single item of equipment has been sacrificed, nor has the truck been cheapened in any way—the chassis now offered at \$1995 being identical in every detail with that formerly sold at \$2685."

OLD ROMAN ROAD DISCOVERED.

Discovery has been made in England of another old Roman road hitherto unknown. Workmen who were digging manholes on the Alton road, where the latter joins the roads to Bentley and Borden, near Farnham, Surrey, unearthed, five feet below the surface, part of what appears to be an old Roman road that ran from London to Manchester. The road was in an excellent state of preservation, the surface layer being a foot in thickness and composed of flints. In order to penetrate the surface the workmen had to use drills and steel wedges. Research has demonstrated that not only the Romans used bituminous materials, including asphalt, but the ancient Sumerians, Persians, Babylonians, Greeks and Egyptians as well. The road discovered in England, according to engineers, was capable of carrying traffic heavier than any to which modern roads are now put.

TRUCKING TRUCK TO MARKET.

Getting the garden truck to market quickly and in good condition is the problem of every truck farmer or general farmer who has a surplus of garden products. The vegetables must reach the market early to be on display for the early morning buyers and they must reach the market quickly to be fresh and in best condition. These conditions have

been met by William Redemeir, an Ohio truck farmer, by the use of a 1½-ton truck.

Mr. Redemeir hauls his garden products 7½ miles to a large city market, starting one-half an hour later than formerly, when a two-horse team was used, and getting back to the farm three to four hours earlier with practically a full day before him for field work. Although the truck is used only a part of each day it speeds the work up so that a great deal more can be accomplished than formerly. To take advantage of the truck on the return trip Mr. Redemeir sometimes hauls stuff for his neighbors and has hauled a great deal of manure on return trips to be used as fertilizer. "Before loading the manure we always cover the body of the truck with a tarpaulin to keep it clean for the vegetables," said Redemeir.

As far as cost of operation is concerned we find, after keeping an accurate cost record of the truck and taking into consideration all overhead expenses such as depreciation, interest on investment, etc., that there is little difference between the truck and the team. For the time the truck is used each day we find it costs \$6.77, including the driver's time. As the team is on the road longer than the truck the services of the driver are required for a proportionately greater period, which makes the total costs practically the same. With a lower price for feed the cost of hauling by team will be reduced. Whether the reduction in costs will over-balance the advantage of saving time for other work and of getting products to market earlier and in better condition is a question the individual farmer must determine.

DEGROAT WITH ACME CO.

L. E. DeGroat, formerly of the sales staff of the Timken Detroit Axle Co., Detroit, Mich., recently joined the Acme Motor Truck Co., Cadillac, Mich., in charge of dealer promotion work.



U. S. Model H Truck Equipped with Steel Flanges and Trailer Hauls Heavy Loads of Lumber Over Wood Track, Thomasville, Ala.

ALL-SEASON CABS IN DEMAND

SUCCESSFUL standardization of truck cabs and bodies is a recent achievement of the Wilson Body Co. of Detroit, Mich. By utilizing a portion of its highly modern body building plant it is producing a line that represents a large saving to every truck builder.

Both cabs and bodies are manufactured in sections, on a quantity production basis, to fit any chassis design. There are two types of cabs, the open with swing doors and curtains, and the closed with sliding doors and glass windows. The line comprises two sizes, a one to two-ton and a 3½ to five-ton size.

The truck bodies are rigidly built upon steel frames with hard wood panels. They combine pleasing appearance with ample strength for strenuous service.

This standardized line enables the truck builder to save in a number of ways. Quantity production in an efficient plant makes possible a low price

cab as regular equipment, among which may be mentioned the Armleder, Diamond "T," Federal, Gary, GMC, International Harvester, Masters, Noble, Packard, Republic.

Features of "Rain or Shine" cab which stand out prominently are rigid construction, swell sides, body of curved construction from back to front; all openings or lights of drop sash nature and double tracks; can be instantly removed or remain a permanent fixture for emergency purposes.

The "Rain or Shine" truck cab is made throughout of the best of material, well ironed at all important joints to prevent movement, and is fitted with a well upholstered seat cushion and lazy back, which provide comfort for the driver. A two-section windshield is fitted in the front of the cab, which may be opened for summer driving or closed in winter.

The cab is an all-season proposition and provides every convenience for the truck driver.

MULTIBESTOS SOUTHERN REPRESENTATIVE.

It is announced that the Hirsig Sales Co., 908 Broadway, Nashville, has been appointed southern representative for Multibestos brake lining. The personnel of the Hirsig Sales Co. includes men well known in the automotive field, among them W. G. Hirsig, former sales manager of the Faucette-Huston Co., Chattanooga; Hi Stalons, the high speed piston ring man; Dick Niles, formerly with the Southern Auto Supply Co., Chattanooga, and Harvey Pride, formerly with the Michelin Tire Co.

The large number of southern dealers and jobbers who use and sell Multibestos brake lining will find their interests well taken care of by this live and progressive firm.

LINE MEN HAVE TRUCK VILLAGE.

A "truck village" is the latest. The motorized scheme of living employed by up-to-date gypsies has other commercial possibilities besides fortune telling.

A large Pacific coast telegraph and



Rain or Shine Cab Open, Providing Cool Compartment for Driver.



Rain or Shine Cab Closed During Cold Weather.

to him. Cabs and bodies are shipped "knocked down" at a great saving in freight charges and in his storage and factory space. As all types and sizes are assembled on standard fixtures he need not carry an expensive stock of special parts. Final assembly is a simple operation readily performed by unskilled workmen.

As both are furnished in priming coats they are ready for final paint the moment they are set up.

Considerable attention has been devoted in designing the cabs to increasing the efficiency of the driver. Their rugged steel construction assures his safety, and their unusually comfortable seat and back cushions add to his comfort while at work.

RAIN OR SHINE CABS FOR MOTOR TRUCKS.

The General Woodwork Co., Cincinnati, O., announces that it is manufacturing a line of cabs under the trade name of "Rain or Shine," which is meeting with wonderful sales to manufacturers of motor trucks who wish to add a cab to their regular equipment.

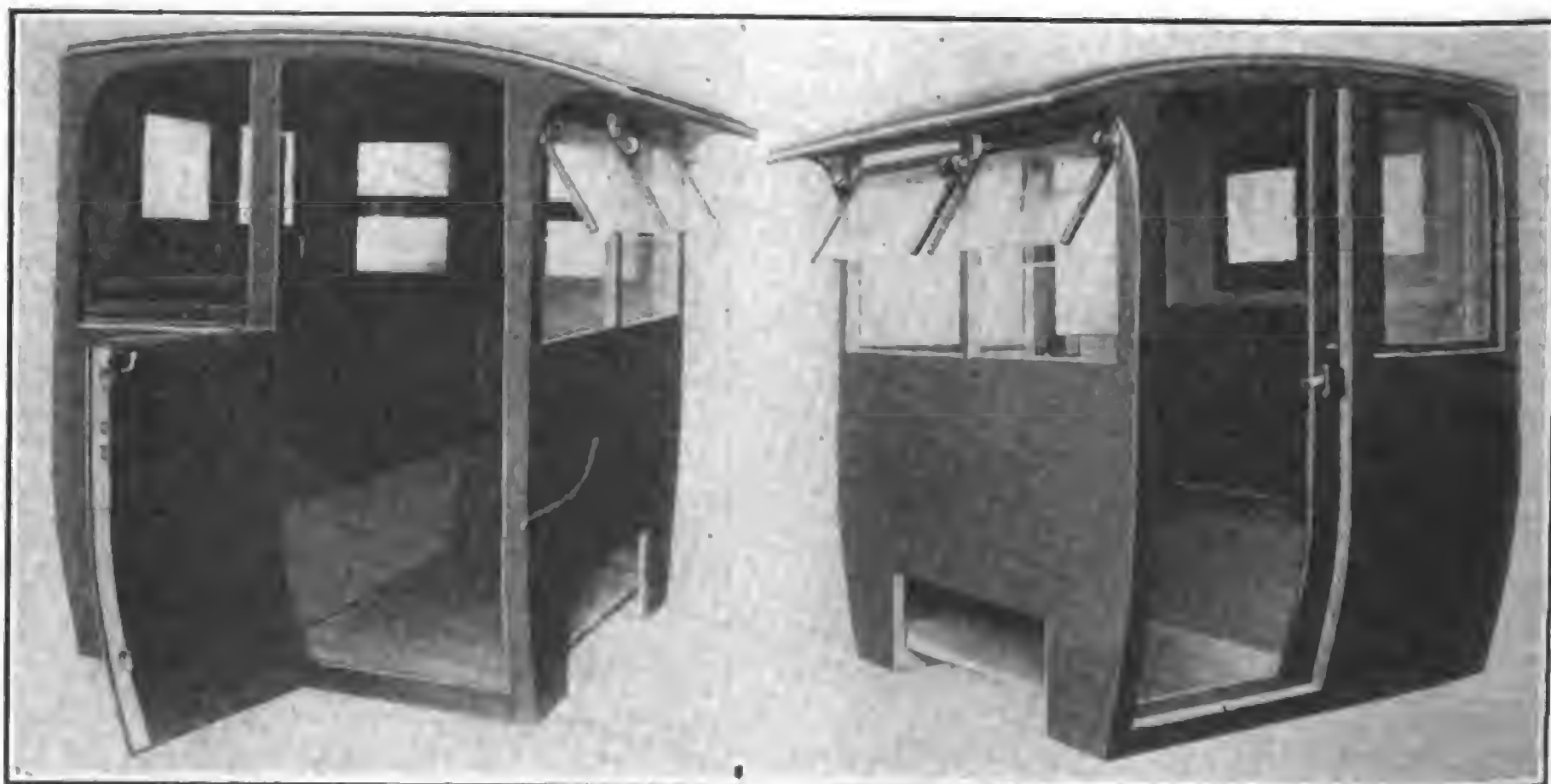
"Rain or Shine" cabs have been designed for the discriminating dealer who wishes to equip his trucks with a high grade cab in keeping with the quality of the truck which he sells. Many truck manufacturers use the "Rain or Shine"

telephone company found it necessary to make a number of repairs on its lines in the Sacramento canyon. Facing the problem of transporting and caring for the repair gang, a couple of motor trucks and seven trailers were put into commission. These provide lodging with beds, toilets and shower baths, while one truck is a kitchen, another carries supplies and another the water tank.

This arrangement solves all the problems of housing and caring for the men, the transportation of supplies and water, and every night, at the close of the day's work, the village is right on the spot. There is no long walk to and from camp, or stupendous job of moving camp frequently. The new plan will doubtless be adapted to many similar jobs where camp cannot be permanently established because of the migratory character of the work, which goes to show that the auto truck has varied forms of usefulness as yet probably undiscovered.

FIAT TRUCKS IN AMERICA.

The representative in this country of Fiat trucks and cars, whose headquarters are at 150 West 57th street, New York city, is offering the Fiat truck and tractor in addition to the passenger car line. The truck line consists of four chain drive models, 1, 1½, 3½ and 5-ton capacities. Prices on three of these, chassis only, delivered in New York city, are given as follows: One-ton, \$2000; 3½-ton, \$3200, and the five-ton, \$5400.



Wilson Cab Accepted as Standard by Many Truck Manufacturers.

WALTER CO. GAS AND ELECTRIC TRUCKS

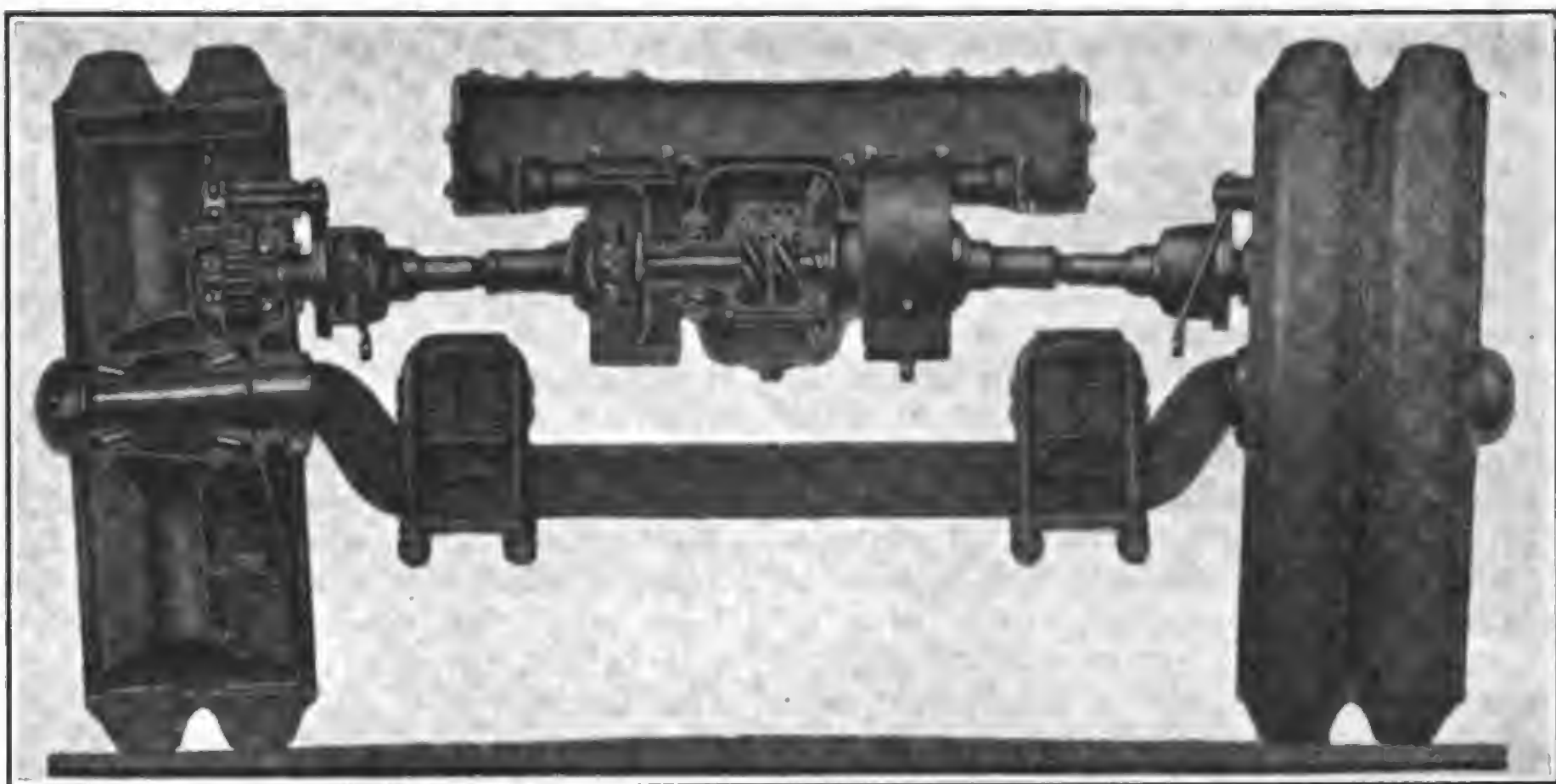
WALTER MOTOR TRUCK CO. of 227 W. 61st street, New York City, one of the oldest truck manufacturers in the industry, after an extensive reorganization now announces several additional units which gives fleet owners a full range of sizes to choose from in both electric and gasoline propelled vehicles. The units now manufactured include beside the gasoline types, 1500-pound and one-ton light delivery trucks, and two, 3½, five and seven-ton heavy duty trucks of the electric type, with an absolute interchangeability of parts throughout, except so far as pertains to their respective motor parts.

Among the many features that make the Walter trucks unusually attractive to motor truck owners is the positive locking differential, which absolutely assures full traction with both wheels, but admits of the compensation necessary for satisfactory motor vehicle operation when turning.

An interesting test which shows the efficiency of this differential is made by the company. A chassis having a load of 11,600 pounds is driven up to a block 10 inches high. This block comes in contact with only one wheel. The other wheel is fully engaged in grease. The truck is then driven over the block, traction being obtained by the single wheel in contact with the block, no traction of course being obtained from the wheel turning in grease. This differential is the subject of a basic patent held by the Walter Motor Truck Co.

Brakes of unusual strength are a feature of the construction of this vehicle and make it possible to lower the loaded chassis, in the test described above, to the ground in such manner that there is almost no impact. Owing to the differential driving both wheels equally it acts as a constant brake equalizer and three of the four brakes may be put completely out of adjustment and yet the truck will skid straight ahead upon the application of the brake on the fourth wheel and the wheel will lock.

The rear wheels of the Walter motor truck are toed in or cambered to allow for the crown of the road, this method of alignment distributing the weight of



Rear Wheels of Truck Are "Toed-In" to Allow for Crown of Road.

the truck equally on all four wheels. A double reduction drive of high efficiency is used which gives the five-ton gasoline model an average of six or more miles to the gallon of fuel, and the other gas propelled trucks a proportionate mileage.

New Interests Identified with Company Through Reorganization.

The Walter Motor Truck Co., through the recent reorganization, is better than ever equipped to handle its large and growing business. Electric truck production has been placed in charge of George W. Wesley, former vice president and production manager of the General Vehicle Co. of Long Island City. It was under his supervision that the many General Vehicle electric trucks running today were built.

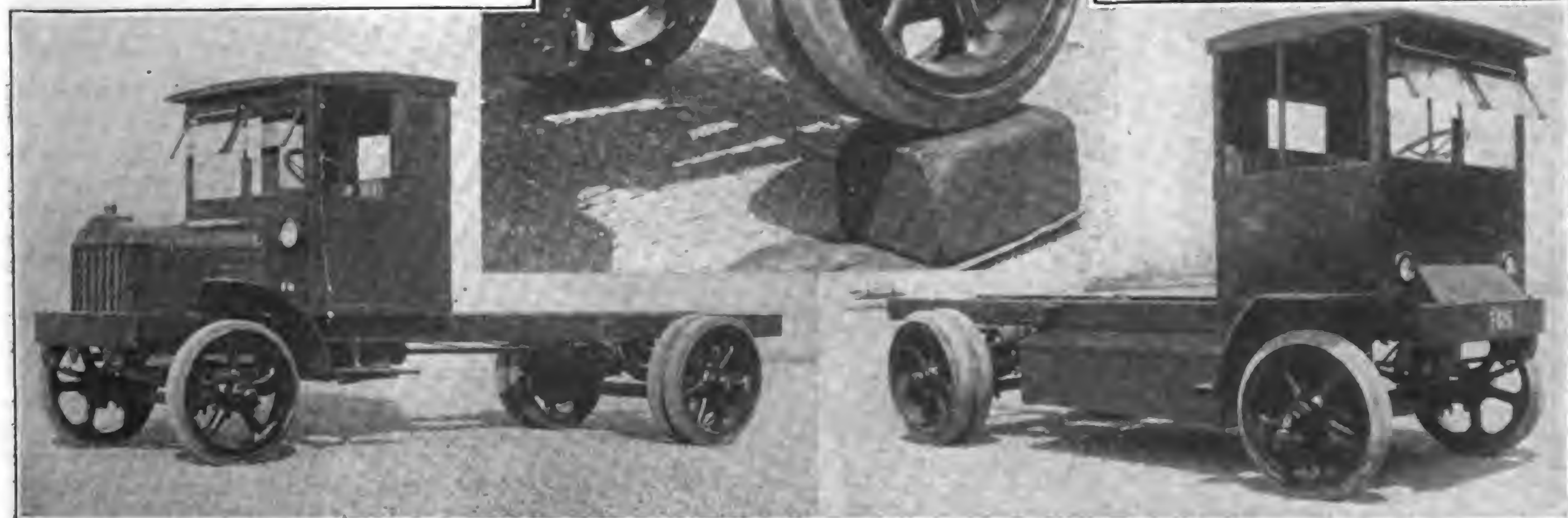
William Walter, vice president, and Maurice Walter, chief engineer, remain with the company.

With the enlarged manufacturing

schedule there came a necessity of determining a definite sales policy and after much thought and consideration it was decided to turn that end of the business over to Fink-Dumont-White, Inc., 405 Lexington avenue, New York city, that company agreeing to take over the entire production of the factory.

Fink-Dumont-White, Inc., is comprised of F. B. Fink, president, widely known as a former member of the General Vehicle Co. sales organization and later as the eastern distributor of the Elwell-Parker Electric Co.; R. Duval Dumont, vice president, is also a former member of the General Vehicle Co. sales department, but more recently vice president and sales manager of the Lansden Vehicle Co., and W. W. White, treasurer, formerly district manager of the General Vehicle Co. and later vice president and general manager of the Karry Lode Industrial Truck Co.

Messrs. Fink, Dumont and White are ably supported by a splendid sales organization and plan to place distributors and agents of Walter trucks, both gas and electric, throughout the country, as well as arranging proper representation in foreign countries. The metropolitan territory is being covered directly from their own offices.



Upper, Interesting Test Showing Efficiency of Differential (See Text); Left, Walter Truck Gasoline Chassis; Right, Electric Chassis.

TRUCKS FIGHTING GYPSY MOTH

THE discovery of the gypsy moth at Somerville, N. J., during the last of June, 1920, necessitated prompt action on the part of state authorities in order to prevent the pest from spreading over the entire state. The gypsy moth, as New Englanders know, is a serious pest of orchard, shade and forest trees, and in severe infestations, trees may be completely stripped of foliage before the end of June. Unless checked in some way enormous damage is bound to result. In the New England area thousands of trees are dead as a result of such defoliation. At the present time a total of \$1,000,000 is being spent each year by the New England states and the federal government in order to hold this insect in check and to prevent its spread.

Realizing the danger to New Jersey's large orchard, shade and ornamental plantings, the state legislature on Nov. 8, 1920, appropriated \$112,000 for immediate use in fighting the moth. With this sum it was possible to put a force of 100 trained men, mostly borrowed from the federal force in New England, in the field at once. These men scouted the entire territory adjacent to the center of infestation and it was eventually found that the moth had spread over an area of about 175 square miles. The egg masses were killed, as they were found, by being painted with creosote. After locating and killing the eggs the next step is spraying, with arsenate of lead, all foliage in the vicinity where eggs were found. In this manner caterpillars hatching from eggs which were missed by the creosote should be killed before reaching maturity.

For this purpose nine Ward-LaFrance trucks, each equipped with Fitzhenry-Guptil spraying apparatus, were purchased by the State of New Jersey and are in use at present. These trucks have a carrying capacity of three tons exclusive of the weight of the sprayer body and have such oversize parts as are necessary to stand the double strain of propelling themselves while loaded to their full capacity and spraying at full pressure. The sprayer pumps are driven from the main drive shaft, the drive being ca-

pable of transmitting the full engine power. Each pump is a single acting triplex plunger type, having cylinders with 3½-inch bore and four-inch stroke and the speed is regulated so as to give a delivery of 50 gallons a minute at a pressure of not less than 600 pounds.

The Ward-LaFrance truck is equipped with a slow speed, high torque motor of 4¾-inch bore and 5¼-inch stroke. The solution tank, which is made of clear white pine, has a capacity of 40 gallons.

Each machine is furnished with 2000 feet of one-inch, eight-ply, rubber lined, smooth waterway, rubber covered, spray hose and the hose and couplings are guaranteed to stand a test pressure of 1000 pounds.

The Ward-LaFrance motor truck and the Fitzhenry-Guptil spraying equipment were chosen to undertake this difficult work only after a commission from the State of New Jersey visited the Ward-LaFrance factory in Elmira, and the Fitzhenry-Guptil factory in Boston. The commission consisted of men from the state entomology department and from the state engineering office. It was necessary to see the machinery in action and to prove to the commission that the units were sturdy enough and had the quality to stand up under the most rigid tests for, when the spraying starts, it is an almost continuous operation without pause, for approximately 40 days, which is about the period of incubation of the moth egg. The service facilities and policy of each company was investigated most minutely, in fact everything that would insure continuous spraying of the moth was thoroughly investigated. These high-pressure spraying machines are necessary in order to apply the poison mixture in a finely divided mist to the tops of the tallest trees, even if several thousand feet of hose have to be used. All foliage along road sides, wooded areas and private plantings in the territory will be kept covered with arsenate of lead while the caterpillars are feeding. This means that an immense amount of work will be required from each machine as all of the spraying has to be done within a

comparatively short time and if this time is cut shorter by rainy weather, even more work will be required by them. Only by having the spraying equipment mounted on motor trucks is it possible to cover the infested area in the short time at our disposal.

All of the control work is being conducted jointly by the New Jersey Department of Agriculture and the United States Bureau of Entomology, and the experience of the federal men gained by long association with the work of fighting the moth in the New England states is reflected in the satisfactory progress made in New Jersey during the past several months.

INTERNATIONAL HARVESTER'S MOTOR TRUCK PRICE REDUCTION.

The International Harvester Co., Chicago, Ill., one of the largest motor truck manufacturers in the country, has announced price reductions on all its motor trucks of from 2000 pounds to 10,000 pounds capacity. The reductions range from \$900 on the 10,000-pound truck to \$100 on the 2000-pound truck. Prices of cabs, tops, bodies and such accessories have been reduced 25 per cent. The new price list follows:

Capacity Lbs.	Tire Equipment	New Price	Reduction
10,000	Solid	\$3 600	\$900
6,000	Truck Cord	2,750	700
4,000	Truck Cord	2,395	565
3,000	Truck Cord	2,032	393
2,000	Truck Cord	1,874	286
6,000	Solid	2,400	400
4,000	Solid	2,100	300
3,000	Solid	1,850	200
2,000	Solid	1,750	100

In explaining these reductions an officer of the company said:

"These new prices reflect prospective reductions in the cost of production made possible by recent reductions of wages throughout our factories, by similar reductions in wages, costs and prices among the manufacturers who supply accessories, and by recent recessions in the market price of raw materials.

"These new prices represent every possible economy in production that we can see or hope for. The price of our new ¾-ton speed truck has been fixed in strict accordance with these economies in production."

NAME OF LUVERNE CO. CHANGED.

A new name has been adopted by the department of the Luverne Motor Truck Co., which is to make the Luverne fire trucks, the Luverne Fire Apparatus Co. The original concern will continue the manufacture of commercial trucks, while the new concern will specialize on fire trucks and fire apparatus equipment of all kinds.

The same financial interests are back of both concerns, and the only object in separating them is for the purpose of preparing for enlarging the facilities for handling fire apparatus business to meet the heavy increase in demand.



Type of Spraying Outfit Mounted on Ward-LaFrance Chassis Which Is Successfully Combatting Gypsy Moths in New Jersey.

Bureau of Public Roads Engaged in Highway Construction

TOTAL MILEAGE TO BE BUILT BY FEDERAL AID NEARLY SUFFICIENT TO ENCIRCLE GLOBE—MANY KINDS OF ROAD SURFACES USED IN PROGRAM THAT WILL DO MUCH FOR FUTURE OF AUTOMOTIVE INDUSTRY.

OF THE 22,030 miles of federal aid roads which have been built or are now under construction, more than two-thirds are earth roads, sand clay, or gravel, says the chief of the Bureau of Public Roads, United States Department of Agriculture. These have cost less than one-third of the total amount expended as compared with nearly 50 per cent. of the estimated cost applied to 4890 miles of hard surfaced roads. A study of local conditions by an engineer of the bureau is necessary before a road project may receive federal aid.

The type of road to be used, and the most suitable surface with respect to the traffic of the locality must be determined. Service must be satisfactory, while costs must be kept low, both for building and maintenance. There must be a careful analysis both of the engineering and economic conditions for each particular project. There are individual considerations in every case which affect the determination as to the best type of road materials for that locality.

The mileage of federal aid roads which

HELP BUILD 22,030 MILES OF HIGHWAY.

On June 1 of this year 22,030 miles of highway, extending into every state, had been completed or were in process of construction, at a total estimated cost of \$361,946,868. The percentage of this total estimated cost which will be incurred for each type, and the mileage of each type, based upon the records of plans approved, are as follows:

PER CENT. AND MILEAGE OF EACH TYPE OF ROAD.		
	Per Cent. Total Estimated Cost	Mileage
Type 1, including earth, sand clay and gravel.....	32.2	15,300
Type 2, including water bound and bituminous macadam	9.0	1,530
Type 3, including brick, bituminous concrete, Portland cement concrete.....	48.8	4,800
Miscellaneous	4.0	310
Bridges	6.0	.....
	100.00	22,030

jects are approved which are not considered suited to the conditions to be met. Many popular fallacies exist as to road improvement, and there have been many misconceptions as to the types of

be placed as soon as funds become available. This allows the road bed to be prepared and become thoroughly consolidated before the surfacing is placed, which is highly desirable from a construction viewpoint. To follow such a course, however, is out of the question when a road is heavily travelled and some form of surfacing must be provided. To care for traffic under these conditions frequently a sand clay or gravel surfacing is provided, which will serve for several years and let allow the road to be maintained under reasonably heavy traffic.

Use Many Kinds of Road Surface.

Granting that the preparation of the road bed has been properly done, many kinds of road surfaces will give excel-

“It is the policy of this bureau to consider the conditions on each individual federal aid project, as there are elements such as subgrade, drainage and present and prospective traffic, which vitally affect the determination of the standards of construction to be used.”

have been built or are now under construction is nearly sufficient to encircle the globe. This is the record of work accomplished since July, 1916, when the federal government first stepped in to aid in the enormous task of building highways that are now called upon to carry more than 9,000,000 motor vehicles plus a very substantial horse drawn traffic in the 48 states.

The Federal Aid law is well named. The Department of Agriculture has given the broadest possible construction to the law for the purpose of providing the greatest mileage of highways suited to the traffic to be carried over them, at the minimum expense. An analysis by the Bureau of Public Roads of the projects under contract shows that all types of roads, from the graded earth road up to the finest paved surfaces, have been built.

The states initiate the road projects but, before federal aid is granted, an engineer of the bureau makes an inspection of the roads to be improved, studies the local conditions, consults with the state highway department and no pro-

roads on which federal aid funds may be used. Properly built earth roads, say specialists of the department, are the fundamental requirement in all highway improvement.

Regardless of the material or type of surfacing which is to be placed, the prep-

“Types of highways should not be specified by law. This is a matter to be decided by the state highway department in which should be lodged full authority both to construct and to maintain. Competition between different types of material should be maintained and selection made to fit traffic requirements in each case. The bureau does not recommend any one type to exclusion of others.”

aration of the road bed requires the highest engineering skill and experience. The department considers that the use of adequate sums for the securing of proper location, thorough drainage, permanent bridges and culverts, and the elimination of railroad crossings is demanded if enduring improvements are to result.

Federal aid is allotted to the improvement of earth roads, but only with the stipulation that a suitable surfacing will

lent service. The element of time is important. There are so many miles of roads to be constructed, and their cost will be so enormous that the most careful and detailed study of each road project must be made to provide, at the lowest possible cost, roads which will give satisfactory service and which can be maintained without undue depreciation under the traffic which is to use them.

1921 Will Be Great Road-Building Year

IT IS expected that the year 1921 will be the greatest road building epoch in the history of the country. Handicaps, such as scarce and high priced materials and labor shortages will be absent this year. A mild winter, which tended to lessen the destruction of roads, and an early spring are favorable to the road building programme for 1921.

When it is stated that the total amount of funds proposed and authorized for road work in the United States at the opening of the present year had reached the stupendous figure of \$1,027,000,000, the result of the good roads propaganda that has been carried on all over the country for the past several years may be fully realized.

And why should not this great nationwide crusade have met with such remarkable success? It cannot be gainsaid that every additional mile of improved highway in a community increases proportionately the wealth of that community. And in the aggregate this means national wealth. And the untold benefit to dwellers in city, suburban and farming districts alike cannot be reckoned in mere figures or cold cash. Comfort, convenience and economy of time and labor in transportation and travel have been promoted by the increased use of automobiles and trucks, which always keep pace with the construction of roads. Who can estimate the value of this to every member of a community?

Five parallel transcontinental highways—duplicates of the Lincoln highway—would represent the highway construction completed in the various states during 1920.

Approximately 20,000 miles of new improved roads were finished, according to reports sent in to the travel and transport bureau of the B. F. Goodrich Rubber Co. Estimates from state highway engineers say that half again and possibly double this mileage will be completed during 1921.

Nebraska, Texas and Minnesota were among the leaders in total mileage of new construction. Nebraska built 1307.5 miles; Texas, 976.59, and Minnesota, 911.06. Nearly every state reports mileage under construction almost equal to the total actually finished.

The states able to furnish reports and their mileages of complete highway follow:

State	Mileage	State	Mileage
Alabama ...	138.21	Nevada	98.68
Connecticut ..	59.00	New Jersey..	45.70
Illinois	397.77	New Mexico..	800.00
Kansas	90.56	N. Dakota..	190.10
Kentucky ..	348.80	Oklahoma ..	50.00
Maine	230.00	Oregon	459.10
Maryland ..	134.41	Pennsylvania	413.87
Michigan ...	462.00	Texas	976.59
Minnesota ..	911.06	Vermont ...	84.74
Missouri ...	228.73	W. Virginia	275.00
Montana ...	292.39		
Nebraska ...	1,307.50	Total.....	7,994.21

At the same time the fact should not be lost sight of that there is still a total of more than 2,000,000 miles of roads in the United States still remaining in a primitive or unsurfaced state. It would appear, viewed in this light, that this country is still rich in opportunity.

The Lincoln Highway.

The first organized project for a great transcontinental system of improved roads was, as is undoubtedly well known, the Lincoln Highway, which has now become a by-word the country over in connection with good roads work.

Usually the first question of the individual making inquiry concerning the condition of the Lincoln Highway is, "What is the road like today?" The answer is given in the figures recently made public by the Lincoln Highway association contained in the following table:

End of 1913—Mileage, 3389; improved, 1598 miles.

End of 1918—Mileage, 3323; improved, 2161 miles.

End of 1919—Mileage, 3323; improved, 2421 miles.

End of 1920—Mileage, 3305; improved, 2853 miles.

That the Lincoln Highway association is doing wonders in the way of bringing about the actual improvement of the transcontinental route is well indicated by the following table showing improvements to date:

Classification of types of road construction on the transcontinental route, New York to San Francisco, Jan. 1, 1921.

Concrete	422.34 miles
Brick	219.68 miles
Bit. macadam.....	401.81 miles
Macadam	287.10 miles
Asphalt	78.00 miles
Creosote block.....	5.90 miles
Granite block.....	7.10 miles
Graded gravel.....	956.00 miles
Natural gravel.....	62.10 miles
Graded earth.....	725.67 miles
Natural earth.....	136.00 miles
Sand	3.30 miles

Total..... 3305 miles

In seven years time a total of \$31,284,520 has been spent in the improvement of the Lincoln Highway. In 1920 alone new construction accomplished on the highway ran as follows: Concrete, 127.5 miles; brick, 7.1 miles; bituminous macadam, 12.2 miles; macadam, .5 miles; gravel, 187.8 miles; permanent earth grade, 206.9 miles; total, 542 miles.

According to present plans the Lincoln Highway association anticipates further improvement in the coming year at a cost of approximately \$10,000,000.

The Ideal Highway.

In this connection it is pertinent to state that the Lincoln Highway association has for the past year or more been making plans for the construction of a stretch of ideal highway which shall exemplify in all respects everything that such a road should be. A technical committee or board of highway experts was appointed by the association to determine the general specifications of an ideal highway and this committee has reached an agreement on all points and the final plans are now being prepared. The ideal section is to be a relatively short stretch of highway, so located as to be easy of access from all parts of

the country for the purpose of inspection, and placed also where it will carry a most representative and diversified traffic in the course of the coming years.

A minimum right-of-way of 100 feet was agreed on. The section is to consist of 40 feet of concrete paving, with reinforcing steel embedded, 10 inches thick and laid in one continuous slab without central subdivision. Forty feet of paving width permits four lanes of travel, a lane for slow moving trucks and a lane for rapidly moving passenger vehicles, in each direction.

The ideal section will be drained by catch basins and submerged tile under the earth shoulders. No danger of being crowded into a ditch. There will be none there.

Public Safety Considered.

The committee provided that the ideal road should have no curves of a radius of less than 1000 feet and that such curves as were necessary should be "super elevated," which means tipped up at the outer edge, to allow for a speed of 35 miles per hour. It provided for the lighting of the route, which would permit of the use of dimmers in the open country, and it added a foot path for pedestrians. The committee allowed 25 feet of right-of-way at the outer edge for development by a landscape architect, provided also in its recommendations for frequent park and camp sites, comfort stations and other facilities for the comfort and enjoyment of the traveler.

The safety and convenience of the traveling public was further considered in the provision for protection of all embankments with guard rails and warning signs and the elimination of all railroad crossings at grade, and the removal of all obstructions insofar as possible, for 500 feet each way from intersections, thus providing a clear view of the coming travel on cross roads.

The committee emphatically pronounced against advertising signs along highways and recommended that ultimately all distance markers and such other signs as might be necessary for the information and guidance of tourists be placed or authorized only by proper state and federal authorities and that distance markers be standardized in character and distance between points uniformly figured from municipal headquarters.

Along the ideal section there will be no unsightly wires, as these will run underground in conduits.

The ideal section will serve the purpose the Lincoln Highway conceived for it and the purpose the United States Rubber Co. had in mind in appropriating the funds necessary to construct it. If the American public will be enabled to gain from it a more adequate conception of the demands of modern traffic in the way of highway improvement and if highway builders having in their charge millions of dollars of public funds, can, through the inspiration of its example and an enlightened public sentiment, increase the adequacy of their specifications and provide for future demand.

MOTOR OMNIBUS FOR RAIL OPERATION.

(Continued from Page 308.)

similar in many details. The latter has a seating capacity of 35, due to the fact that there is no operating mechanism in the forward end, making the combined seating capacity of the two-car unit 66 passengers, which is larger than that of the usual steam coach. Directly in front of the seat across the forward end is an "emergency" brake staff and drop ratchet handle which, as is the case with all emergency brakes, is used only occasionally when circumstances demand it. Also, this trailer is mounted on a Brill type of special running gear, equipped with 30-inch diameter wheels and having an eight-foot wheelbase, which has been in operation on many street railways in the United States and abroad.

The two busses are coupled together by a Brill "radial" draw bar and a signal cord extends through both busses, enabling the conductor on the trailer to signal the driver of the motor bus.

As economical operation was primarily the reason for the development of this gasoline driven railroad motor omnibus and trailer, and as the number of miles per gallon of gasoline is influenced largely by the weight moved, every effort was made to secure the lightest construction for the service. Consequently, the motor car complete weighs approximately 12,000 pounds and the trail car complete about 6000 pounds. One motor car in regular service averaged as high as 14 miles per gallon of gasoline.

THE TREMENDOUS GROWTH OF MOTOR TRUCKING.

Evidence of the tremendous growth of motor trucking in the United States is substantiated by the fact that today there are over 10,000 motor haulage lines in this country, some of which have invested as high as \$2,000,000 in their trucking equipment.

This tremendous investment, states the New York Evening Sun, is a tribute to the efficient service that these motor haulage lines have rendered the country in the past few years. In addition to transporting food, the other three necessities of life fuel, raw material and manufactured articles—have been hauled by the ubiquitous motor truck.

The motor truck is gradually taking a dominating place in the haulage of all these articles, except for distance heavy haulage. The retail distribution of fuels such as coal and oil, naturally falls to the trucks.

They are also effectually used in the transport of all kinds of raw material. They are used in mining copper, graphite, gold, lead, manganese, mercury, phosphate, salt, silver, sulphur and zinc. Building materials such as gravel, leather, lumber, cement and sand are all very largely handled and distributed by trucks. Immense lumber sections in the northwest, which otherwise could not be tapped, are being reached by them.

Motor trades use 50% of 100,000,000 feet of plate glass made each year.

Speeding Delivery of Small Lot Freight

THE latest idea in transportation equipment is the container car. It has been tried out by the New York Central railroad between New York, Cleveland and Chicago, and is certain to spread to other shipping centers between which there is a constant exchange of commodities.

The mission of the container car is to expedite delivery of less than carload volumes of freight from shipper to consignee. Its use calls for coordination of carriers—steam railroads, motor trucks and electric railways.

Vault-like compartments, built to occupy one-third or one-sixth the floor space of a 50-foot freight container car, or one-ninth the floor space of a 66-foot express car, are loaded at the warehouses of shippers, transported by motor trucks to the railroad yard, there lifted by crane to the freight or express car and secured by hooks and steel guides for the next stage of the journey.

Arrived at their destination the compartments are again lifted by crane to motor trucks, rushed to the doors of the consignees, unloaded and then returned to the railroad cars either light or reloaded.

Time saving at every stage is the primary object of the container car system of store door delivery. First of all, exponents of the system point out, time is saved at the shipping point because elimination of rehandlings between shipping and receiving points makes costly crating of products unnecessary; elimination of rehandlings and checking makes necessary the services of fewer truckers and clerks; and immediate unloading of goods at store doors eliminates the item of demurrage, at the same time promptly releasing freight cars, clearing yard tracks of idle cars and reducing congestion at freight station platforms.

Container cars are of two types, one designed to carry express and the other freight. Each of the nine compartments of the express type car has a capacity for three tons. The freight train type of car carries compartments of two sizes and can accommodate two large and two small, one large and four small, or six small removable sections. The capacity

of the small sized section is 3500 pounds, of the large section 7000 pounds.

The steel compartments, besides being fireproof and weather tight, are made burglar proof by setting them on to the cars in such a manner that the doors, even if they could be unlocked, could not be opened without holisting the whole compartment above the steel bulkhead behind which it fits.

For the express type of car, one of the fields of potential usefulness is the United States mail service. Container car service has already been tried out in the shipment of magazines and periodicals from New York to Chicago. One express car, its nine compartments filled with mail, left New York at 5 a. m. one day and arrived in Chicago at 8 a. m. the next. The mail was then rushed by motor trucks to the postoffice.

On the first trial trip between Chicago and Cleveland, with groceries from the Reid Murdoch Co. to its Cleveland branch, three to eight minutes were consumed transferring each compartment from the freight car to the motor truck, and five or six minutes lifting each loaded "vault" to the car. Loading of the compartments took about one-half an hour.

Returning from Cleveland to Chicago, one large compartment carried battery parts from the Willard Storage Battery Co. to its Chicago branch, another contained paint from the Tropical Paint & Oil Co. for its Chicago branch, while a third small compartment carried dental gas in crated cylinders from the Ohio Chemical & Manufacturing Co. for its Chicago branch.

Every article shipped reached its destination in first class condition and in the same position in which it had been placed at the shipping point.

GUARANTEES TOOL PRICES.

The Black & Decker Manufacturing Co., Baltimore, Md., has notified its distributors that present prices are guaranteed until the end of the year. The company states that the total increase in the prices of all its products since 1914 has been only 38%.



Loading Cargo of Parts, Hauled from Factory of White Motor Co. to a New York Central Container Car at Cleveland, O., Shipment Was Consigned to Chicago Branch of the White Company.

NEW STEWART ONE-TON SPEED TRUCK

STEWART MOTOR CORPORATION, Buffalo, N. Y., announces a new one-ton speed truck, the principal features of which are unusual gasoline efficiency, tire mileage and hill climbing ability. This new model easily negotiates 22 per cent. grades with a capacity load. It shows an average of 14 to 16 miles a gallon on gasoline, and speed in excess of 40 miles an hour with a capacity load. Its easy riding qualities are stated to be equal to most passenger cars. It has a short turning radius and all the mechanical units contain the latest known engineering improvements.

The new Stewart one-ton is distinguished particularly by its power plant. The engine used is the new Buda model MU motor. This motor has been designed particularly for speed truck work, and has a bore and stroke of $3\frac{1}{8}$ inches by $5\frac{1}{8}$ inches respectively. The cylinder head is removable, and also the cylinder block, making the engine one of the most accessible on the market. This engine is rated at 21.03 S. A. E. horsepower.

Ignition is through Elsemann high-tension magneto, and carburetion is accomplished by the new model Zenith carburetor which is adjustable with a hot spot quick starting device.

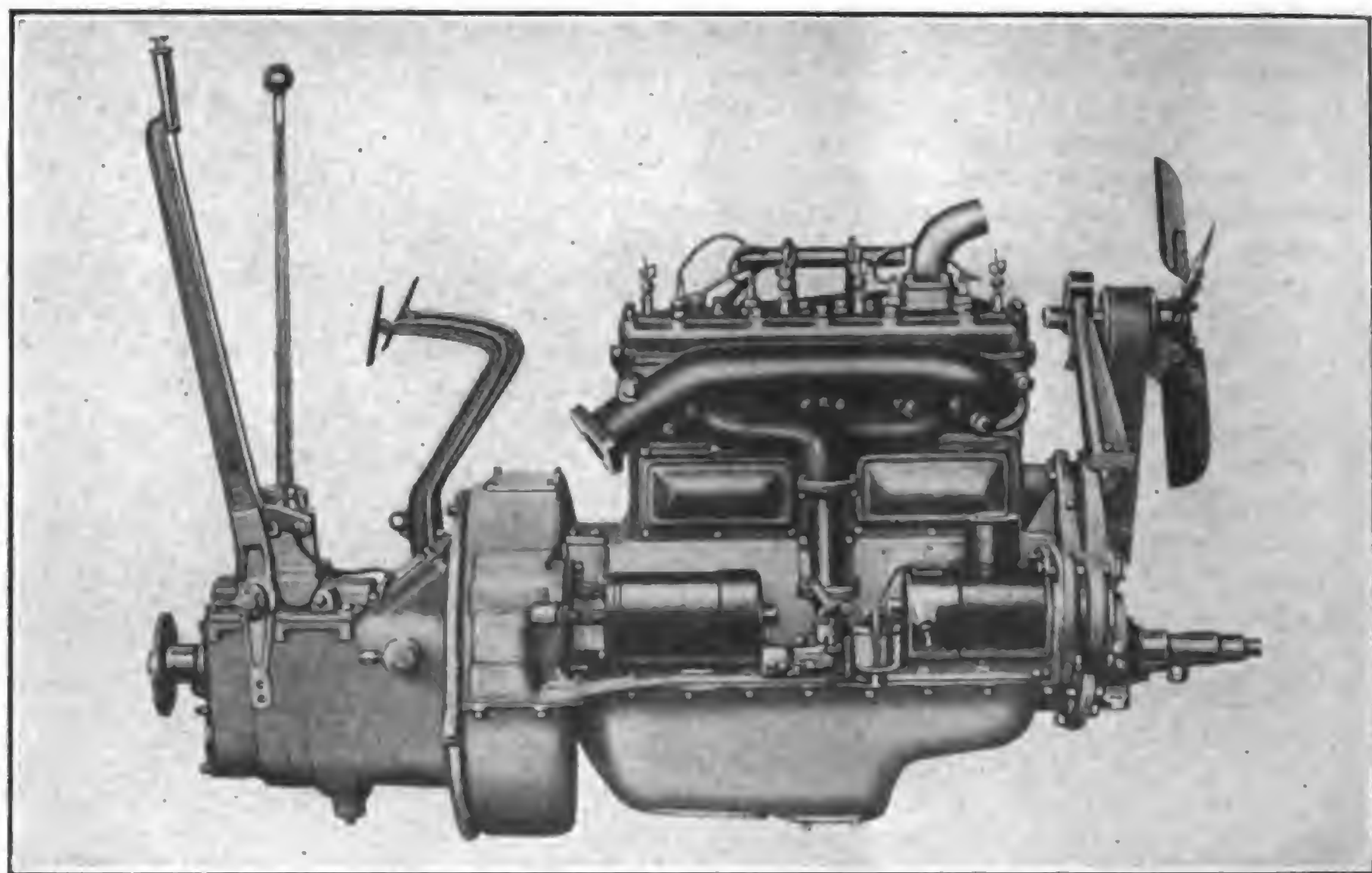
The gasoline is fed to the carburetor by gravity from a 16-gallon round type tank, which is made of terne coated steel to prevent rusting and corroding, supported on malleable iron brackets under the seat.

The engine lubrication is through full force pressure feed to the crankshaft, camshaft bearings and connecting rod bearings. The chassis lubrication is effectively secured through the Alemite system. Water is circulated by a centrifugal pump having a large bronze runner.

The radiator is of the cast iron armored type with vertical tubes, and has a capacity of five gallons.

The clutch is of the dry plate, multiple disc type, with one set of steel plates, and another set of steel discs lined with moulded clutch facings.

The engine, clutch and transmission are mounted as one unit, on three-point suspension. The shafts of the transmission are mounted on annular ball bearings.



Buda Model MU Engine Proves Economical in Service.

The transmission gear shifter fingers are made of .20 carbon steel and are case hardened to prevent wear.

The rear axle is a Clark internal gear drive, the same as has been used so successfully on other Stewart models for the past several years. It is geared 6.75 to one so the total reductions from engine to rear wheels are as follows: High, 6.75 to 1; intermediate, 11.48 to 1; low, 27 to 1; reverse, 30.38 to 1.

The front axle is of the drop forge type, $1\frac{3}{4}$ inches wide by $2\frac{3}{8}$ inches deep, made from the best grade of carbon steel obtainable, and is especially heat treated.

The steering knuckles, which are exceptionally strong and large, are forged from nickel steel and heat treated. The ball on the steering arm is $1\frac{1}{2}$ inches in diameter and is hardened and ground to size. The axle spindles are $1\frac{3}{8}$ inches in diameter, nickel steel, hardened and ground to size, the dimensions being held to very close limits. They are very large for the loads they have to carry.

The steering gear is of the screw and nut type with an adjustment on the thrust bearings for removing any end motion of the screw that may develop.

The frame side rails are $4\frac{1}{2}$ inches

deep and $2\frac{1}{4}$ inches wide, and the thickness of the steel used is $\frac{3}{16}$ of an inch. There are three cross members, two of which are hot riveted solidly in place.

The front springs are semi-elliptic type, 41 inches by 21 inches wide, equipped with full length rebound plate. The entire spring is made of special grade silico manganese alloy steel, heat treated for flexibility and long life, equipped with bronze bushings working on hardened steel pins, and equipped with the Alemite high-pressure lubricating system.

The rear spring is semi-elliptic type, 54 inches by two inches wide, equipped with full length rebound plate. The entire spring is made of special grade silico manganese alloy steel, heat treated for flexibility and long life. The rear springs also have bronze bushings, and the Alemite greasing system.

The wheels are the artillery type, 12 spokes front and 14 in the rear. The spokes are square.

The truck is equipped with 35 by five-inch cord tires all around. The regular equipment consists of electric headlights, with legal lenses, equipped with dimming device; electric tail lamp, tool box, 111-hour Willard storage battery, tools, jack, horn, oil gauge and armature. The chassis is painted red with black fenders and running board.

The price of this chassis complete with the above equipment is \$1875, plus war tax, f o. b. Buffalo; equipped with starter \$50 additional.

This one-ton Stewart truck will take an open or covered express body, panel, stake or special farmer's grain type body.

BODY COMPANY AGAIN REDUCES.

A second reduction within the last four months is announced by the United Automotive Body Co., Euclid at 49th St., Cleveland, on all its body production. Reduction this time averages 25% and is said by the manufacturer to place prices in many cases below the pre-war level.



New Stewart Speed Truck Designed for Fast Delivery Work.

Do Certain States Intend to Legislate Trucks off the Road

**IF RESTRICTIONS ARE ABSOLUTELY NECESSARY LET THEM
BE UNIFORM IN ALL STATES—PRESENT METHODS WORK
INJUSTICE TO INDUSTRY.**

A CONSTRUCTION company in Chattanooga, Tenn., recently spent \$50,000 in five-ton trucks only to have legislation passed limiting the total weight of truck and load to 7½ tons, according to an authentic report that has just been forwarded to MOTOR TRUCK. This is only one of many similar instances.

The present method of limiting the weight of motor trucks as practised by the different states is little short of rank injustice to all truck manufacturers and operators. Promiscuously handled as it apparently is, it gives the industry an unnecessary lot of trouble, and is merely another obstacle in the way of progress.

If truck restrictions are absolutely necessary—and there is as yet no proof that they are—the proper way to handle the matter is for the states to get together and decide on certain rules that will be adopted by all. As matters now stand an operator may load in Massachusetts with a load that is of legal weight. He starts, let us say, for purpose of illustration, for New York city, by the way of Rhode Island and Connecticut. He reaches Rhode Island. Through this state he could legally carry a load that would vary from that which was lawful in Massachusetts. He reaches Connec-

ticut and goes to jail because of having an overload. Cutting down his load after paying his fine he starts for New York, only to find there another set of road rules. The whole thing as it now stands requires that the driver be an expert accountant, a lawyer and a civil engineer all in one.

Traffic crosses and recrosses state lines and it is an unjust absurdity for the owners of trucks operating legally in one state to find, as soon as he has crossed the state line, that he is subject to heavy fines and even imprisonment for using the same trucks in the same manner on identically the same kind of roads as characterized the other state.

Not only do such conditions work injustice to the truck manufacturer and the truck owner, but they are harmful to the taxpayer, for contractors cannot go in and compete in states where a large portion of their equipment may be barred from use and where the contractors who actually bid upon work are restricted to equipment that may not be operated as economically as the heavier units.

More Millions for Highway Work.

In addition to the \$1,000,000,000 already available in bond issues and direct levies for federal, state, county, district and

municipal highway work, most of which was provided during the past three years for expenditure in 1921 and 1922, new bond issues now contemplated have just been reported to the Highways Information service, New York city, amounting to \$164,371,355.

The figures include contemplated bond issues for state highways, county, township and district roads and city streets. By states the proposed new bond issues are as follows: Alabama, \$1,087,000; Arizona, \$735,000; Colorado, \$5,000,000; Connecticut, \$40,500,000; Delaware, \$410,000; Florida, \$2,094,000; Georgia, \$1,045,000; Indiana, \$795,000; Iowa, \$750,000; Kansas, \$261,000; Louisiana, \$150,000; Maryland, \$120,000; Massachusetts, \$74,000; Michigan, \$3,195,000; Minnesota, \$1,783,000; Mississippi, \$520,000; Missouri, \$10,414,000; Montana, \$200,000; Nebraska, \$510,000; New Jersey, \$5,187,000; New Mexico, \$147,000; New York, \$2,109,242; North Carolina, \$5,765,000; Ohio, \$14,596,139; Oklahoma, \$1,114,000; Oregon, \$1,006,000; Pennsylvania, \$53,453,000; South Carolina, \$2,915,000; Tennessee, \$3,262,500; Texas, \$3,681,000; Virginia, \$810,000; Washington, \$129,000; West Virginia, \$21,000; Wisconsin, \$1,231,000; Wyoming, \$300,000.

CALIFORNIA WEIGHS SUSPICIOUS LOADS.

Five scales for weighing and recording the loads of suspiciously heavy trucks have been purchased by the California State Highway Commission. This is the beginning of a determined effort to keep overloaded and excessively heavy trucks off the public highway in that state. The move is in the line of road preservation. While the state officials admit that many of the roads are not what they ought to be, yet the roads must be taken as they are until means are found to improve them. It is only justice toward all road users of the highways to keep load weights of trucks within reasonable bounds. Early in the 1920 season New Jersey started the weighing of suspiciously heavy trucks. Other states will undoubtedly adopt the plan for if it is physically impossible to get a road improved to withstand the heaviest of motor truck loads the only possible way of protecting the road for the use of the general public, which is fully 99 per cent. of the traffic on the highway, is to keep the heavy truck off the highway.

Four per cent. of the world's motor vehicles are found in Canada.

UNITED STATES HIGHWAY POLICY AT CROSS ROADS.

America's highway history reaches a climax this week in Congress. Owing to the expiration of the present federal appropriation on June 30, the entire road building policy of the United States must now be restated, revised and translated into immediate action. The Townsend bill, which has been favorably reported out of committee in the Senate, embodies the recommendations recently made by President Harding for a Federal Highway Board to correlate road building programmes. The Motor and Accessory Manufacturers' association through its board of directors has gone on record in favor of the Townsend bill.

"This is not only a vital transportation problem, but a matter of the most fundamental importance to the entire country," said M. L. Heminway, general manager of the association. "Highways are too important to be relegated to a subordinate bureau of any government department. Highways are primarily a matter of economies and transportation affects all departments of the government. Furthermore, a federal highway commission will insure continuity of policy, which is essential. The Townsend

bill proposes a federal highway commission of five men to take over and unify the highway conditions of the national government and to lay out an interstate highway system, coordinating highways and national forest roads. This commission is to be appointed by the President with the advice and consent of the Senate and with due regard for geographical location. An appropriation of \$100,000,000 is made for a period of two years. This does not constitute an increase. It is simply a continuance of a long established and well recognized policy of the government. Unlike many other ordinary and essential expenditures of the government, this appropriation will yield almost incalculable dividends. Everybody who is interested in reducing the high cost of living and I can imagine no more comprehensive group than this, should support the Townsend bill. It was President Harding himself who said, 'I know of nothing more shocking than the millions of public funds wasted in improved highways, wasted because there is no policy of maintenance.'"

Prince of Wales highway is the name of the road under construction between Ottawa and Prescott, which will link up the Canadian capital with New York.

SAMSON TRUCK DEMONSTRATING TOURS

THE Samson Tractor Co., Janesville, Wis., has put over a unique truck demonstration which has produced remarkable results, both from a sales and engineering standpoint. With the newly designed truck to merchandise and facing the problem of successfully marketing the truck during these difficult times, the officials of the concern cast about for the best method of procedure. It was finally decided that 11 trucks should be sent out into the various branch territories, spending from one to two and three days with each Samson dealer along the route, demonstrating the truck's qualities, special features and remarkable efficiency and economy of operation for both farmer and city man. It was pointed out that great good would result not alone from a sales standpoint, but also from that of engineering. These truck tours would serve in all six purposes—introduce the new truck to trade and prospects, uncover prospects, promote sales, help Samson dealers, gain new dealers and, due

The trucks finally determined upon to make the tours were regular $\frac{3}{4}$ -ton stock jobs with nothing but regular equipment, which included electric lights, starter, extension bases and cleats. These trucks had been running all winter between the Janesville plant and the Samson malleable iron plant at Waukesha, Wis. They had made 6000 miles carrying capacity loads, travelling every day and in all sorts of weather over roads that sometimes were nearly impassable. With this 6000 miles as a starter it was planned that the trucks should be given such a complete work out that any faults in their construction and design would be sure to appear before the completion of the run.

The drivers chosen to operate the trucks were not mechanical experts or service men. Rather, they were chosen as the type of ordinary driver, possessing only sufficient mechanical knowledge for the successful everyday operation of a truck. The whole idea was to put into the field a Samson truck and to operate

anxious time for those at the home office. No word had come in about the trucks because of the stoppage of telegraph and telephone service. The consensus of opinion was that the trucks, powerful as they were, had surely become stalled—thrown completely off schedule by the storm—for surely no automotive unit could possibly plow through under such conditions. Finally word came from the telegraph office that service was restored and soon the first telegram arrived, reporting on truck No. 2 from Fort Madison, Ia. "Arrived tonight. Roads very bad. Telephone lines and trees block road. Had to move them. First one through since storm. Made 75 miles today. Motor and truck O. K." This telegram was closely followed by a second, from truck No. 3, at Iowa City, Ia. "Bought a shovel, started and by doing some shovelling got to Vinton over road that no car or truck has tried since the storm. Had some hard going through plowed fields where roads were drifted full of snow, but the Samson walked right along in mud and slush with axles dragging the snow along, but she went on her own power and got to Cedar Rapids. Arrived here tonight as per schedule."

It was indeed an occasion for jubilation at the home office for it was realized that a remarkable feat had just been performed by the trucks, a great victory for Samson construction. "The first one through." Soon from Streator, Ill., came a telegram from truck No. 5. "We left Dwight for Streator at 5:40. Arrived Dwight, a distance of 23 miles, over roads that could not possibly be worse, in two hours and 20 minutes. It has rained in this part of the territory for past three days. The roads are black gumbo and clay. The mud came up to our axles. At Streator they were betting that we could not get through, but the way our little '15' plowed through the mud made me a stronger booster for Samson than I ever was before. In some places we went in over our hubs and had to back out, but with a fresh start we went through with colors flying. When we arrived in Dwight motor was warm, but not hot."

Trucks Maintain Schedule.

It is an outstanding accomplishment of the Samson demonstration tours that every one of the trucks maintained its schedule throughout the storm. Farmers everywhere along the line were astounded at the remarkable performance of the trucks. Some who have never given the motor truck a thought, due to the seemingly impassable condition of the roads at certain seasons of the year purchased Samson trucks on witnessing these performances.

The blizzard having been successfully weathered and the roads becoming passable for the ordinary car, insuring a crowd of farmers in the towns of call, the regular routine of the demonstration tours commenced. No. 2 truck, which had travelled through the worst of the storm, was driven to Des Moines, Ia., and escorted by a fleet of Samson trucks



Start of Samson Demonstration Tour from Factory, Janesville, Wis.

to the gruelling grind to which the trucks would be subjected, bring out any minor faults in the new truck and enable the engineering department, by close observation and by the correcting of these faults, to produce the best truck on the market.

Branch Managers Cooperate.

Work was immediately begun on the plans and schedules. The various branch managers were instructed to prepare tentative routes whereby a maximum number of their dealers could be visited in the shortest possible time. It was also necessary for them to personally travel these routes building interest and enthusiasm amongst the dealers and securing the promise of active cooperation from them.

In the meantime the home office was busily engaged getting out the preliminary promotion work. Special advertisements and form letters were sent to the dealers along the routes, together with electrotypes of the demonstration trucks. Letters and telegrams were sent to the dealers and the thousand and one other details attended to which were so necessary to the success of the tours.

it just as it would be operated under ordinary, everyday conditions, to be driven by the ordinary driver and to perform the operations of every day.

Start of Trucks.

On Wednesday, April 6, the first truck started, bound through the Wisconsin and Minnesota territories. What proved to be a sure indication of the forthcoming result of the tours was received in the form of a telegram from the truck driver $2\frac{1}{2}$ hours after he had started. "Arrived Palmyra, 40 miles, in one hour and 50 minutes. Sold one Samson truck." Since then the remarkable success of the demonstration tour as a merchandising factor has been thoroughly proven.

Five trucks had been dispatched on their way when the storm came, the terrific blizzard that worked such tremendous havoc through the central portion of the middle west, filled the cuts with snow, swept the country side, tore down telephone and telegraph wires, snapped off trees at their bases, stalled trains for two days, made roads impassable and resulted in a large number of deaths and frightful destruction. It was indeed an



Samson Truck Demonstrators Called on New and Old Dealers, Selling Many Trucks.

from the branch warehouse, paraded through the business section of the city. This parade was so successful that later on the truck was brought back and the performance repeated with the same success.

But reaching the farmer prospects was the first consideration, the primary object of the tours. At each dealer's place of business the farmers assembled to witness the demonstrations were asked to suggest work for the truck to perform. They were impressed with the fact that the Samson truck crew wanted to do the hard things—climb the steepest hills, haul the bulkiest cumbersome loads, for that sort of load is easy for the Samson.

For the benefit of those unfamiliar with the Samson line, it may be said that Samson trucks are built with the driver's seat placed over the transmission and with the steering wheel, clutch and brake on the left of the engine. This does away with the waste cab space, giving to the Samson truck nearly 33 1/3 per cent. more loading space and also distributing the load equally over all four wheels, lessening wear on truck and tires. It also brings the truck box or platform much closer to the ground, making the loading of bulky, cumbersome and easily breakable commodities much easier and safer.

Trucks Demonstrated in All Lines of Service.

During the tours the Samson trucks demonstrated the hauling of nearly every conceivable commodity at the request of those interested, lumber, coal, dirt, slag, sand, ice, milk, gravel, glass, salt, cement, paint, newspapers, flowers, farm crops, cattle, etc. An effective demonstration of the safer and easier method of handling glass, due to the lower body, was made, resulting in a sale. One truck hauled a load of sand from a loose sand pit where other trucks have been pulled out by horses. This same truck travelled 11 miles in 35 minutes carrying 1400 pounds of ballast on two-thirds of a gallon of gas, or about 16 miles to a gallon; a remarkable performance if empty, but surely exceptional considering the load. Some of the greatest accomplishments were performed by truck No. 4 during its invasion of the eastern territory. The crew of this truck made up their minds to give the extension bases, with which

Samson trucks can be equipped, a thorough trial. These rims and cleats, placed on the wheels and held above the road on good going, furnish effective traction for the truck in all sorts of hard going and enable the Samson truck to travel muddy roads and plowed fields. The crew determined to travel the worst roads to be found in an endeavor to find a place that would hold the truck. After a week of such going a letter was received from them. "To date we have been able to cross everything easily and to the amazement of all bystanders. Farmers ask us, 'How do you get through those roads? We have attempted nothing but on horseback all spring.'"

Summary of Tours.

From the start of the tours the reports received have been remarkable. Wherever Samson trucks are operating, for the tours are by no means finished, splendid records are being made; "impassable" roads travelled, "unclimbable" hills climbed, the impossible accomplished. It is too early to publish fuel and oil records, the trucks barely having commenced on their comprehensive schedules, which will take them through July, August and even into September. But the reports already received point to the establishing of a great fuel and oil record.

Many benefits have been derived

from these novel tours. This unique series of truck demonstrations, the successful endeavor of a fighting company which refuses to say "die," but fights until the drop of the hat has stirred up business, uncovered an untold amount of live prospects who are now operating Samson trucks, helped old dealers and obtained new. These tours have opened the eyes of all along their routes—farmer and city man—to the tremendous possibilities at hand for increased revenue, better markets, all-the-year-around truck usage, and greater economy through lessened cost of operation and increased loads that have been automatically opened up to the present and potential truck user through the design and construction of Samson "Quick-Trip" trucks.

Nor has the sales department been the only one to benefit by these tours. The driving, plow-through tactics that have been pursued by the truck crews under all conditions and over all sorts of roads and fields has been a gruelling test for the newly designed trucks. Daily reports have been sent to the engineering department where a crew of engineers and mechanical experts have carefully and systematically scrutinized them, watching for defects, faults and weaknesses. It is the avowed determination of the Samson Tractor Co. that from these tours is to come the greatest, most efficient and economical truck on the market, as mechanically perfect as brain and hand of man can devise.

SPECIFICATIONS.

Engine—Samson.
Bore and Stroke—3 11/16 by 4-Inch.
N. A. C. C. Rating—21.8 Horsepower.
Cooling—Pump Circulation and Plain Tube Radiator.
Lubrication—Splash.
Carburetor—Zenith.
Fuel Feed—Gravity.
Clutch—Plate Type.
Ignition—Simms.
Gearset—Three-Speed Selective Located Amidship.
Final Drive—Spiral Bevel Gears.
Rear Axle—Samson.
Gear Ratio in High—6.33 to One.
Gear Reduction in Low—21.02 to One.
Steering Gear—Samson.
Tires—Pneumatics, Front and Rear, 32 by 4-Inch.
Chassis Weight—2300 Pounds.
Wheelbase—116 Inches.



Samson Trucks Encountered All Kinds of Travelling from the Best to the Poorest.



Unique Method of Delivering Two Chassis on Short Haul Deliveries.

TRAVELLING FOOD SHOP BOON TO THE MODERN HOUSEWIFE

Denver housewives, whose apartments afford but limited cooking facilities, or who have spent the afternoon shopping or visiting, have had their dinner problem solved by the Denver Table Supply Co. This concern operates a travelling kitchen and delicatessen store, which consist of an elaborate enclosed white body on a Republic truck chassis, driven by a young woman in uniform.

The big vehicle visits a modern apartment house district just before meal time and "miladi of the cliff dwellers" can order a family meal from the conventional soup to dessert. On the truck are steam tables for keeping food and dishes warm, a range for cooking short orders and an expert chef whose dexterous hands prepare the food. A refrigerating compartment, installed on the truck keeps meat, fruits, milk, etc., in prime condition, and plenty of storage space is available for foods which require neither extreme heat nor cold.

The company doesn't have to solicit business in advance. It's Republic truck travelling restaurant covers a regular route on schedule, so that patrons know exactly what time to expect their "dinner truck" and plan the dining hour and evening functions accordingly.

THE WATERLOO OF THE MULE.

There are more than 5000 mules for sale in St. Louis and Kansas City, Missouri's two greatest mule markets, where rent and feed are expensive. The mules have been virtually "eating their heads off" since last July. They are a drug on the market, and the dealers owning them have been waiting for buyers, but can't even get a bid. The stagnation in the trade in mules is almost without precedent. However, it shows that the farmers are beginning to realize that upkeep is a most important question, and the cost of feeding any mule, whether he is employed or idle, is not relished by any farmer with an eye to profits.

The hay and grain eating mule is an expense that efficient farming must eliminate, and the great number of mules offered for sale, and the lack of buyers,

show that the farmers are realizing the economies and efficiency accomplished for them by the motor truck.

FIGHTING MOSQUITOES ALONG THE ROADS.

That road construction and maintenance should be so handled as to avoid leaving holes or improperly drained ditches and culverts in which stagnant water may accumulate and afford a breeding place for mosquitoes and thus contribute to the spread of diseases like fever and malaria, is urged by the United States Public Health service. Health officers have suggested that all pits and ditches used by road contractors be filled up or cleaned out before they leave the work. In Georgia, New Jersey and other states mosquitoes have been found in large numbers in pits, holes, ditches and improperly drained culverts, and in some cases disease has been traced directly to their presence. Health officers have become impressed with the absence of mosquitoes along highways built of bituminous materials. The pests seem to have a particular aversion to asphalt or tar.

One automobile stage line, operating out of Los Angeles, Cal., has 67 busses and carries over 800 passengers daily.

UNIQUE METHOD OF DRIVING AWAY TRUCKS ADOPTED BY FAGEOL

The Fageol Motors Co., manufacturer of the Fageol motor truck, shows a unique method of delivering two trucks instead of one to distant distributors.

One man is able to deliver two Fageol trucks by the use of a temporary fifth wheel, which is placed on the rear end of the forward truck frame. The truck which is to be towed is jacked up at the front axle and the towing truck is backed under the channel bumper on which a king pin is mounted. The front wheels are then removed.

In this manner trucks have been regularly delivered to Los Angeles from San Francisco without mishap. The ease of loading and unloading and the small amount of assembly work required after delivery make this method cheap for reasonable distances.

REO SPEED WAGONS DO YEOMAN SERVICE AT PUEBLO.

Reo Speed Wagons, made by the Reo Motor Car Co., Lansing, Mich., are said to have been the first vehicles of any description to enter Pueblo after the recent flood. These Speed Wagons, loaded with food, tents and bedding for the stricken city, were forced to travel over roads considered impassable, but they successfully ploughed through the mud with their full supplies.

In addition to the first Reos which entered Pueblo under their own power, General Hamrock requisitioned all that he could obtain in Colorado Springs, sending them by train to a point as close to the city as the train would take them. Twenty-seven were furnished by O. G. Sellers, Reo dealer at Colorado Springs.

These Speed Wagons were immediately set to work at assisting in the clearing of debris caused by the flood. With relief drivers alternating they were kept busy 24 hours a day. Speed Wagons with power pumps were used to drain cellars where the water had settled.



Republic Truck Equipped with Travelling Kitchen a Boon to Busy Housewives of Denver, Col.

TRUCK SUPPLIES CITY WITH WATER.

Among the many uses to which the motor truck has been put since its entrance into the commercial world, one of the most extraordinary and novel yet reported, is that of furnishing a city's water supply.

The accompanying photograph shows an FWD fire truck at Clintonville, Wis., pumping water for that city's supply into a tower, shown in the distance, which is 164 feet above the pumping station and approximately one mile away from it.

During a recent electrical storm the motors used at the pumping station in that city were burned out and in the emergency the fire truck was called upon and filled the bill in a very efficient manner. The truck, equipped with a 500-gallon pumper, was located near the city's well and the intake nozzle lowered into the water. The water was pumped through two lines of hose which were connected to the pipe lines inside of the pumping station.

COST OF COUNTRY HIGHWAYS HIGHEST IN WYOMING.

Wyoming is to set a new record in the United States for high cost of country highway. A nine-foot reinforced concrete road will be built from Casper to Salt Creek for the special accommodation of heavy truck traffic. On each side of the concrete there will be a gravel road of the same width for the especial use of light traffic. Cost of the nine-foot concrete will be \$79,485.17 per mile. The total cost of the 4½ miles of road is estimated at \$368,597.17.

GARFORD'S EUROPEAN MANAGER IN NEW YORK.

A. E. Fauts, who for the past two years has been in Europe in the interests of the Garford Motor Truck Co., Lima, O., has returned to New York, where he will confer with officials of the company on European truck markets and the future policies of the company in that field.

The Colorado State Highway Commission is considering a plan for illuminating the road from Colorado Springs to Denver, a distance of 75 miles.

How to Bring Truck Business Back to Normal

(By F. L. EDMAN, Advertising Manager, Transport Truck Co., Mount Pleasant, Mich.)

How to Keep the Motor Truck Business from Getting Too Far "Off" Through This Period of Readjustment? How to Bring Business Back to Normal?

THESE are certainly questions of vital interest to every truck manufacturer, salesman, distributor and dealer.

Advertising is, of course, one of the chief considerations in arriving at satisfactory answers to these questions—not just any sort of advertising, however, but advertising to meet conditions.

The Transport Truck Co. fully realized this from the beginning of the re-alignment period, and our advertising staff promptly started work to evolve a campaign that would break the solid and growing wall of apathy, indifference and waiting—and move trucks.

It is called "The Evidence Campaign." Its slogan is "Piling Up the Evidence."

Evidence convincingly presented showing just how good motor trucks do build business for the dealer, and do enable the user of transportation to operate more economically and more profitably, is the basis of all the advertising.

Not an entirely new idea, but attired in a new garb and presented in a thoroughly convincing manner.

The net result of pounding home the actual records of truck business building and transport performance has been to interest new distributors in the line—to facilitate the work of our distributor's salesmen by breaking down sales resistance as well as inspire them to greater effort.

There has been a lot of talk about the need of good old fashioned salesmanship. The period of war prosperity softened us the critics say. Well, this campaign was designed to put the punch back into salesmanship, as well as to make the market—or the people who ought to constitute a truck market—realize that they cannot get along without trucks.

In form the campaign is unique. The same heading, "Evidence," runs from month to month over the advertisements, which are in colors. One cannot overlook it. A new story is told in each advertisement. Not a long story, but the

facts boiled right down and presented in simple, clear cut and interesting English. Always there is an illustration from a photograph—a new distributing plant that has been built on Transport business, a fleet of trucks some salesman has just sold by hard and intelligent work, Transports that have established unusual service records.

Then there is a miniature reproduction of the preceding month's advertisement, in a corner of the page, large enough to permit an easy reading of at least the head lines. Under this is a head line "Piling Up the Evidence," with a 25-word review of the former advertisement. You see, neither the salesman nor prospect is permitted to forget it. Fine press proofs of each advertisement are sent to every dealer to post in his windows or to use in modeling his own advertising.

It is this advertising that has brought out the fact that distributors have been able to build fine plants right through the present period. It has enabled alert salesmen to take orders against amazing competition.

And better than all it has convinced men who ought to use trucks that they are losing money in waiting for "better times."

In a word, it is a campaign that "starts something."

CHINA TO BUILD WIDER ROADS.

According to reports from the Permanent International Association of Road Congresses to the Asphalt association, New York, Hsu Shih Chang, president of the Chinese republic, has issued an executive order providing that in carrying out the Chinese good roads programme, roads shall be wider. Roads connecting Peking with the capitals of the provinces hereafter will be 55 feet wide and those connecting the capitals of the provinces with the seats of the districts will be at least 33 feet wide. Roads between the district seats are to be not less than 27½ feet wide.

ESTABLISHES OWN STORAGE PLANT.

Bergen county, New Jersey, has prepared plans for a complete storage plant for bituminous materials used in road construction and surface treating, to be located at Hackensack, the county seat, and having a capacity of 1,500,000 gallons. The plant will consist of four 50,000-gallon storage tanks, two 4000-gallon heating tanks and a hollow tile storage warehouse 25 feet by 40 feet in size. The county officials expect to save large sums of money in storage costs through the erection of the new plant.

The American Legion has organized a Motor Transport Club in New York city.



FWD Fire Truck Pumping Water for City Supply, Clintonville, Wis.

FLEET OF TRUCKS TO HELP PROHIBITION

THE Atlas Brewing Co. was organized at Chicago, Ill., in 1891, and within a comparatively short period of time its beers became among the most popular not only in Chicago, but throughout the entire middle west. Since the prohibition laws went into effect this same concern has endeavored to produce a beverage which would take the place of the old time beer and put on the market the well known brand of today, the Atlas, in barrels and bottles, either light or dark.

While the keg beer department of the company is unusually busy, special attention is also being paid to the bottling department, with a production capacity of 72,000 bottles a day. This department today is supplying not only the Chicago homes, retail stores and wholesale houses by its fleet of Federal trucks, but its many branch houses and wholesalers throughout the United States.

Thirteen Trucks Displace 150 Horses.

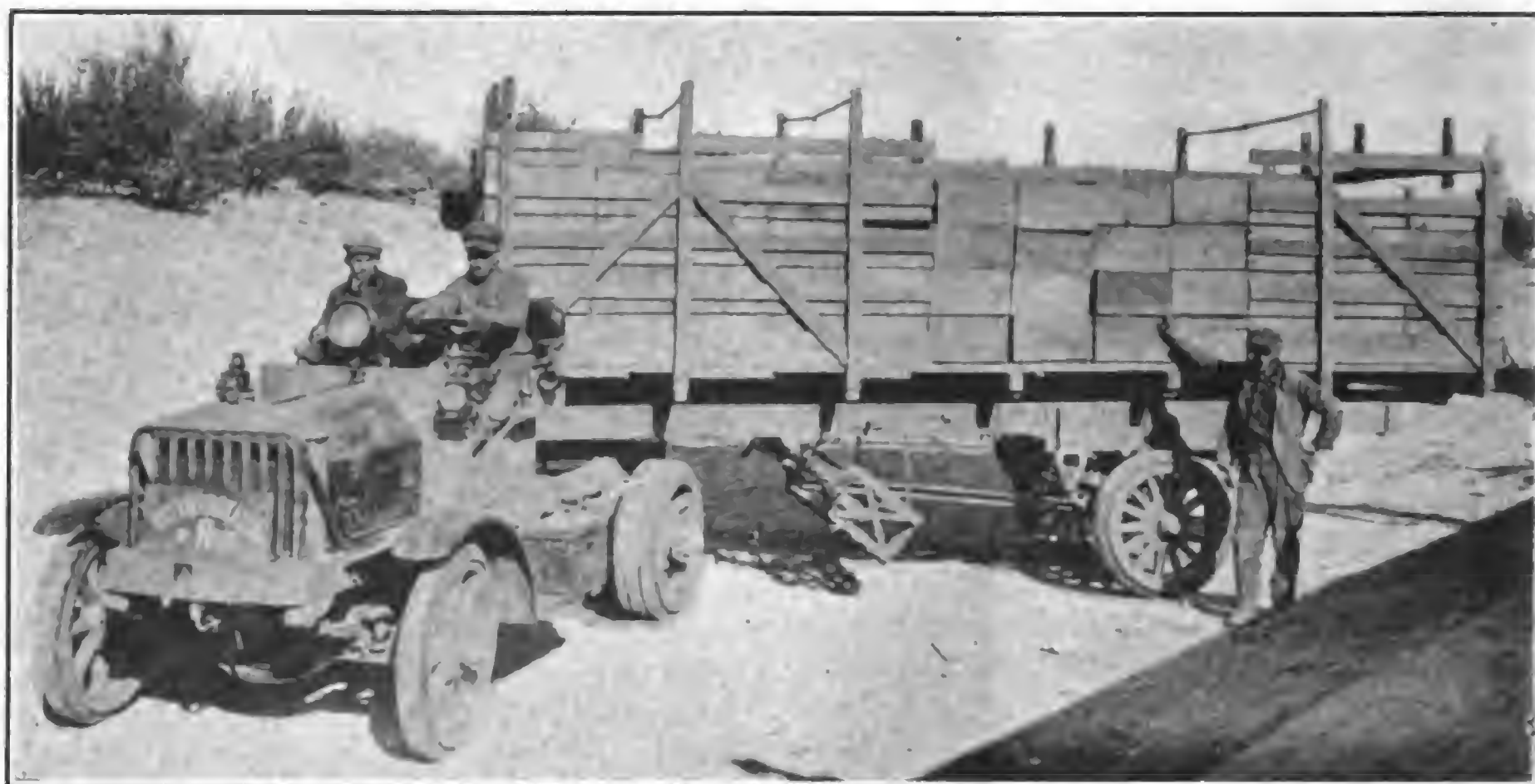
Over 150 horses at one time took care of the delivery of the Atlas products, until about 10 years ago the company started using auto trucks. The first truck was of five-ton capacity, in use for eight years. Today a fleet of 13 Federal trucks has solved the delivery problem and they are covering more than twice as much territory as the horse drawn vehicles did 10 years ago.

The experience of the Atlas Brewing Co. in getting its truck transportation problem down to a practical working system with a minimum of expense and a maximum of performance is worthy of study to those interested in truck problems.

Various systems of cost accounting were tried out one after another and given up because no headway to speak of was gained, it having been found that the time required in making complicated daily reports and the impossibility of getting accurate reports more than offset the advantages gained.

This resulted in working out a simple daily report signed by the drivers, showing the amount of gasoline and oil used. On the same line was added repair man's time and kind and cost of material used. These daily reports were made up monthly on cards for each car. Finally a recapitulation of all cars is made up which shows at a glance the comparative cost of operation on all cars.

Such items as insurance, depreciation, etc., are left at the main office and au-



Lee Truller Popular in Orchard Haulage Service.

ditig department in order to prevent duplication of records and extra clerk hire. In short, the system used is sufficient to show from day to day whether the truck is giving proper service, and if not, why.

Trouble Car Ready for Emergencies.

In the repair shop the slogan is "Keep 100 per cent. of the trucks running 100 per cent. of the time." One visiting the shop rarely finds a truck there as every possible trouble is anticipated and prepared for in advance.

All drivers are instructed to make no attempt at repairs themselves nor allow anybody, not connected with the shop, to tamper with their trucks. In case of trouble a telephone call will bring two men with all necessary repair parts and tools in a few minutes.

The trouble car has a full complement of carburetors, gasoline connections, complete magnetos and all parts that usually go wrong. It may be interesting to state that all such parts are standardized and interchangeable on all trucks.

In the shop every effort is made to make repairs in the quickest possible time. One cannot find a single article that is not essential. A full stock of cotter pins, lock washers, bolts, nuts and other parts are kept on hand; all such parts are kept in a wall case of pigeon holes and the use of cigar boxes and pans for keeping parts is not tolerated. The result is when a mechanic wants a part he knows at a glance in the proper pigeon hole whether or not it is on hand.

Should a part wanted be out of stock

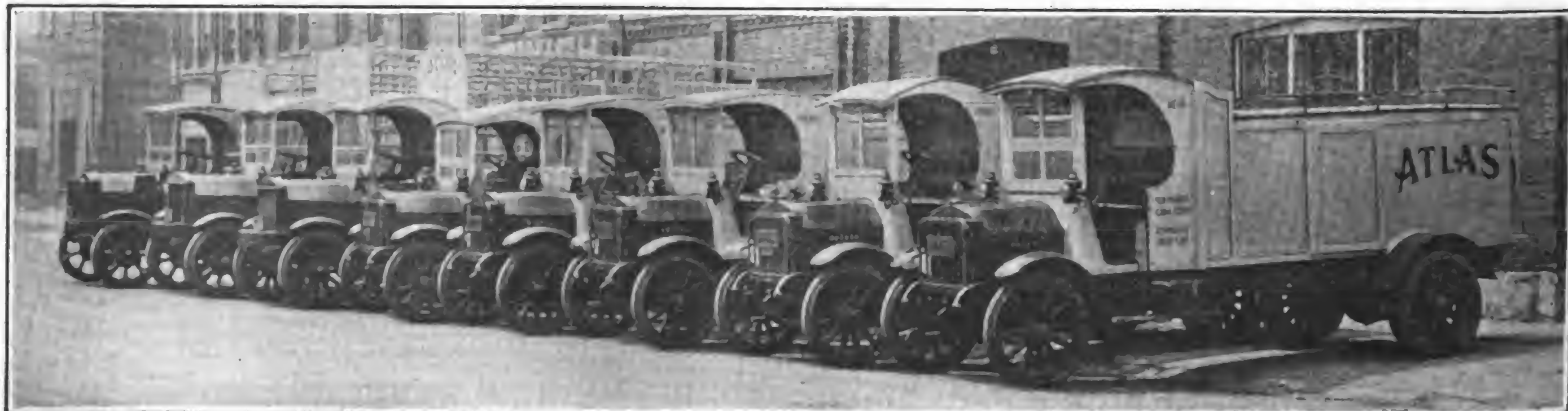
no time is lost turning the place upside down in the hope of finding it. Broken and worn parts and tools are not allowed to collect in the shop, but are deposited in a junk box in the yard; this results in a great saving of time.

Delivery—getting the product to the right place at the right time—is the most important problem of the bottler. His business demands of his delivery system efficiency, economy and above all else, 100 per cent dependability to meet the urgent calls which are ordinary routine in the distribution of bottled goods.

PACKARD SHOWS GAIN.

Packard trucks and passenger cars have sold in greater volume each month since the first of 1921, according to a recent report. In April 221 vehicles were delivered in the Metropolitan territory, compared with 136 cars in March, 87 in February and 75 in January. Figures recently published indicating that Packard delivered only 51 cars in the first quarter were erroneous, as actual shipments in New York for three months ended March 31 last, were 298 cars. The truck business, which up to April has been slow, is showing marked improvement.

Favorable report has been ordered by the Senate Postoffice and Post Roads committee on the Townsend bill to create a federal highway commission and to establish an interstate system of public roads.



Fleet of Trucks Owned and Operated by Atlas Brewing Co., Chicago, Ill.

AUTOMOTIVE ENGINEERS HOLD SUMMER MEETING AT WEST BADEN

The Society of Automotive Engineers held its summer meeting at West Baden. The sessions were well attended, interesting and valuable to members.

President Beecroft, in his address, pointed out the necessity for educational work and the need for intensive research. "Foreign trade," he said, "while directly a merchandising activity, has a very direct connection with engineering and its future will be to no small extent dependent upon the knowledge the engineer has of the conditions and the characteristics of the people in the countries in which his product must perform."

In connection with transportation he urged equitable distribution of the burden among the rail, the highway and the air, and that the engineer must do his part to secure the most efficient use of transportation in all branches.

Highway Transport Session.

The Highway Transport session brought out a paper by A. T. Goldbeck of the Bureau of Public Roads, in which he brought out the point that the cost of road construction and maintenance is entirely too high and that roads must be built that will stand up longer than a year or two. A point which he stressed in his paper is that the vehicle and the road must be better suited to each other, that at the present highway construction and vehicle construction are not closely related to each other. Although Mr. Goldbeck does not wish to go on record as actually favoring the multiple wheel vehicle, he feels that this construction should be given careful consideration as a means of increasing the life of the road, at the same time permitting increased carrying capacity.

Officers Nominated.

The nominations for the various offices were as follows: President, B. B. Bachman, chief engineer of the Autocar Co.; first vice president, J. V. Whitbeck; second vice president, motor car engineering division, F. E. Watts; marine engineering, O. W. Young; aviation, V. E. Clark; treasurer, C. B. Whittlesey; councillors, two-year term, Lon R. Smith, C. F. Scott, H. M. Crane; councillor, one-year term, W. R. Strickland.

The treasurer's report shows that the society is in fine shape financially, the net assets being stated to be nearly \$130,000.

The membership now totals 5468, of which 51 per cent. are active members. Detroit leads with 325 members to its credit. The meetings committee, C. F. Scott, chairman, reported that in October the society plans to gather with the American Society of Mechanical Engineers at the Aberdeen proving grounds, at the invitation of the United States ordnance department. The date of the mid-winter meeting will be decided later. Extension meetings are also contemplated in such localities where no regular sections exist.

HOWELL IN CHARGE OF SCHRADER'S CANADA BRANCH.

Stephen E. Howell, formerly in charge of the Chicago branch of A. Schrader's Son, Inc., Brooklyn, N. Y., has been promoted to the position of manager of that



Harry Geib, New Manager of Chicago Branch of A. Schrader's Son.

company's branch in Toronto, Canada. He succeeds Harold L. Cole, who has been transferred to the main office at Brooklyn. Mr. Howell has been a member of the Schrader organization since 1915.

The company has also appointed Harry E. Geib to the post of manager of the Chicago office. He has had special training for this position and will doubtless give efficient service to patrons in that section.

SECRETARY REMY CITES VALUE OF LOCAL FAIRS.

Oliver E. Remy, secretary and manager of the Wisconsin State Fair, by way of showing the vast audience which the motor car, truck, tractor and power farm equipment reaches through the state and county fair institutions in Wisconsin, says that in 1920 the 82 expositions of



Stephen E. Howell, Recently Promoted to Be Manager of Toronto, Can., Branch of A. Schrader's Son, Inc., Brooklyn, N. Y. this nature attracted a total aggregate attendance of more than 1,200,000 persons and receipts of \$1,075,034. Every fair devoted at least some space to exhibits of commercial and passenger cars.

CONVENTION OF TRAFFIC MANAGERS TO BE HELD AT PITTSBURG

Traffic representatives of manufacturing companies which distribute their products through public merchandise warehouses will meet in convention at the William Penn hotel, Pittsburgh, Pa., on June 16 and 17.

The convention will be held under the auspices of the Shippers' Warehousing and Distributing association, which was organized at Chicago a year ago for the general purpose of effecting standardization and simplification of forms, documents, practises, rules and regulations in the business relationship between the manufacturers and the public warehouse industry.

Uniformity, overages and shortages, taxation on stocks in warehouses, methods of billing, systems of reporting of stocks—these will be some of the general subjects which will be discussed at the Pittsburgh convention. Solution of the various problems with which shippers are confronted in distributing products from factory through the public warehouse to retailer and consumer will work toward cutting down the costs of distributing.

Manufacturing companies which route goods through warehouses are eligible to membership in the Shippers' Warehousing and Distributing association, and their representatives will be welcomed at the Pittsburgh convention regardless of whether they join the organization.

WOULD COMPEL SALE OF 10,000 MO- TOR VEHICLES.

Disposition of the large stock of surplus army truck and automobiles is still proving a bone of contention to committees of the Senate and House, which are considering the proposition. Congressman Anthony of Kansas and a few supporters in the House are demanding that the House managers stand pat on the House provision which would compel the secretary of war to sell to the public 10,000 motor vehicles. The Senate managers, however, are apparently unwilling to recede from the amendments adopted by the Senate which made it optional for the secretary of war to sell or transfer to the Department of Agriculture and the State Highway commission surplus equipment.

As the present fiscal year is rapidly drawing to a close, it is essential that conferees reach an agreement at an early date in order that funds may be available for the maintenance of the army. There has been considerable agitation by the organized state highway commissioners in behalf of the transfer provision. Congressman Anthony has led the fight for the immediate sale of all surplus motor equipment, contending that the road builders in the various states cannot absorb such equipment as may be transferred hereafter. The sale of equipment at depots controlled by the Motor Transport Corps provoked some uneasiness among dealers for a time.

World-Wide Promotion and Market Research Planned

Assurance of hearty cooperation in his plan for closer contact between the Department of Commerce and business groups was given to Herbert Hoover by representatives of the National Automobile Chamber of Commerce upon their recent visit to Washington.

The representatives in expressing the satisfaction of motor vehicle manufacturers with the plan, gave evidence that all possible efforts would be made to cooperate fully in accordance with any suggestions emanating from the Department of Commerce.

To Appoint Committee.

To that end a committee of the National Automobile Chamber of Commerce is to be appointed, which will cooperate with the Department of Commerce in devising plans for the effective promotion of foreign trade in United States motor vehicles.

The cooperation should result in a foreign trade service of two kinds, promotive and intelligence. Before starting promotive work for the sale of motor vehicles abroad, the committee would confer with experts of the Bureau of

manufacturers to whom it should prove invaluable when gauging foreign markets for their products.

May Aid in Solving General Export Problems.

That not only directly is this cooperative arrangement advantageous to the automobile industry, but that these joint efforts may be made beneficial also indirectly in the solution of general problems affecting United States export trade was the belief expressed by the representatives who included J. Walter Drake, chairman of both the Hupp Motor Car Co. and of the Foreign Trade Committee of the National Automobile Chamber of Commerce; H. H. Rice, vice president of General Motors Corporation; H. M. Jewett, president of Paige-Detroit Motor Car Co.; C. C. Hanch, vice president of the National Automobile Chamber of Commerce; Alfred Reeves, general manager, and G. F. Bauer, foreign trade secretary.

SPECIAL COMMERCIAL BODIES.

The Brownell & Burt, Inc., Washing-



Special Police Ambulance Body Designed by Taunton Concern.

Foreign and Domestic Commerce familiar with the particular countries in which the campaign is to be launched. Through these conferences the promotive work could be made to conform to the actual requirements of the various countries.

Will Make Surveys of Foreign Markets.

The intelligence service is to consist in world-wide surveys to ascertain the foreign demand for motor vehicles and the collation of specific trade information. The surveys, by including data and information on costs of foreign products as compared with American, export trade of competitor nations, production and consumption, would enable the manufacturer to decide on a broad policy for foreign trade. What specific information is essential to the American manufacturer would be ascertained by the committee, which thereupon would confer with the Bureau of Foreign and Domestic Commerce regarding means for securing it.

The information, when received, would be distributed through the committee among American motor vehicle

ton street and Hodges avenue, Taunton, Mass., is the builder of special commercial bodies for hearses, casket wagons, police patrol, ambulance, etc.

The body shown in the illustration is intended for police ambulance service for the removal of people who have been injured on the street and is equipped with a couch, stretcher and upholstered seats for the attendants.

Brownell & Burt bodies are known for their high quality and are built for hard, consistent service.

TO DEVELOP LIGHTING SYSTEM FOR LINCOLN HIGHWAY.

The problem of providing proper lighting for country roads is to receive careful consideration in the construction of the ideal section of the Lincoln highway.

The technical committee appointed by the Lincoln Highway association to determine the specifications for the ideal section of the Lincoln highway, early agreed unanimously that the ideal section should be lighted. They did not at-

tempt to say how. The problem was one for the best illuminating experts and engineers obtainable. Now arrangements have been made by the association with the General Electric Co. of Schenectady, N. Y., whereby the illuminating experts of that organization will develop a lighting installation which will be put in along the ideal section.

W. D'Arcy Ryan, chief illuminating engineer of the General Electric Co., the man who originated and developed the lighting arrangements for the Panama Pacific Exposition, will, with the assistance of his staff, develop in consultation with the association's consulting highway engineers, the best, safest, most economical and satisfactory lighting installation possible. Mr. Ryan and other officials of the General Electric Co. are greatly interested in the problems presented and mean to provide an installation along the ideal section which will serve as an example for the lighting of thousands of miles of American highways during the coming years.

Like the United States Rubber Co., which because of the interest of its officials in the development of modern highways, contributed the fund for the construction of the ideal section, the General Electric Co. will contribute the service of its experts, the facilities of its laboratories and the fullest cooperation of its entire organization in the development of ideal lighting installation.

NEW SALES MANAGERS FOR SERVICE.

E. T. Herbig, general sales manager of the Service Motor Truck Co., Wabash, Ind., has announced the appointment of four new divisional sales managers, as follows:

Roy E. Breeden has been put in charge of Division Five, which consists of the entire State of Michigan and northern Ohio.

Walter Dix, formerly of the Packard company, gets Division Two, handling Maryland, Virginia, North Carolina and part of Delaware. L. A. Poundstone has been transferred from Division Five to 16, comprising the State of Pennsylvania and parts of New Jersey.

Fred G. Whipple has been put in charge of sales in California, Arizona and also Nebraska.

GOETHALS & CO. NO LONGER WITH PIERCE-ARROW.

The working agreement between the Pierce-Arrow Car Co., Buffalo, N. Y., and George W. Goethals & Co., Inc., has been terminated and George W. Mixer has severed his connection with the latter company to continue as president of the Pierce-Arrow Co. Goethals & Co. was employed to assist in bringing the Pierce-Arrow plant back to a peace basis and to revise its line of cars and trucks. This work, it is stated, has been accomplished with the new line of cars placed in production.

Motor vehicles with defaced or damaged engine numbers can be seized in Pennsylvania.

REORGANIZATION OF SHARON PRESSED STEEL CO.

Harry W. Torney of Torney & Co., recently made president of the reorganized Sharon Pressed Steel Co., has taken in hand the refinancing of the concern and states that the company is now in a position to handle production and delivery of car and truck frames up to 1500 per day.

Manufacture is now in charge of Arthur W. Swan, general manager, who was formerly chief engineer and works manager of the Crucible Steel Co. and its associates. A recent addition to the plant is the 4000-ton Mesta press which, with the former 1800-ton hydraulic equipment, puts the Sharon plant in a strong production position. The plant at Sharon, Pa., is on the Erie, Pennsylvania and New York Central lines, in the heart of the steel producing district, with every raw material requisite for manufacture within easy reach. The labor situation is unexcelled and the company is especially favored in its present labor equipment owing to the fact that lack of work in the surrounding district has enabled it to add to its force a corps of picked labor.

NEW LEGISLATION IN ARIZONA.

Through the cooperation of the Arizona Automobile Dealers' association and its secretary, George S. Foster, who has been constantly in attendance, there are now before the state Legislature the following measures:

Uniform traffic laws; a bill to give garage men virtually a mechanic's lien on automobiles on which work has been done; a bill arriving at the value of used cars in the hands of dealers, as the present method of assessing value is out of proportion to the actual resale value. A bill has just been passed providing sufficient emergency funds for reconstruction of state roads at once, which will put life in good roads movement.

The Blue Sunday law was absolutely defeated.

TO MAKE NIGHT TRUCKING SAFE.

In Wyoming it is planned to erect light houses along the main highways to make night trucking safe. The light houses will be equipped with varying shades of light and by a flashing code will signal drivers that there is a bad stretch ahead. A yellow light will indicate a dangerous curve and a red light will indicate a railway crossing. With this plan it will not be necessary for drivers to stop to inquire about the roads or cause them to travel under schedule time because of unfamiliarity with the highway.

BROSSEAU ELECTED DIRECTOR CHAMBER OF COMMERCE.

At the ninth annual meeting of the Chamber of Commerce of the United States, recently held at Atlantic City, A. J. Brosseau, president of the International Motor Co., was elected a director for a term of two years.

Mr. Brosseau is secretary and a director of the National Chamber.

NOTES FROM THE FOREIGN FIELD

NEW DUTIES ON MOTOR VEHICLES IN BELGIUM.

The new tariff in Belgium, which went into effect on April 11, makes some changes in the classification of various motor vehicles and their concomitant accessories.

The former duty on commercial cars (complete or chassis) up to 8800 pounds, was 150 francs per 100 kilos, and for passenger cars within this limit, 240 francs per kilos. All cars weighing above 4000 kilos paid 75 francs per 100 kilos. Motorcycles were previously charged uniformly at the rate of 360 francs per 100 kilograms (220 pounds).

Under the new tariff the term vehicles includes all carriages driven by electricity, petrol, gasoline, or steam, such as touring and closed private cars, cycle cars, tricycle cars, large and small trucks, delivery cars, busses, sight seeing cars and the like. The chassis without the motor or body is subject to the same rate of duty as the complete car, even when some accessories or parts are missing. All such vehicles weighing under 2000 kilos and passenger cars weighing between 2000 and 4000 kilos, are now dutiable at 20 per cent. ad valorem, while commercial vehicles weighing between 2000 and 4000 kilos are now dutiable at the rate of 12 per cent. ad valorem, as are all vehicles weighing above 4000 kilos. Chassis which show plainly by their construction that they are intended for passenger cars are taxed at the higher rate, and if any doubt exists in this connection the lower rate of 12 per cent. will be charged. Some latitude, therefore, seems to exist regarding light chassis which could be used for touring cars or light delivery cars.

Chassis frames enter as parts and pay only 12 per cent. ad valorem, while parts entered separately but capable of being set up as a complete chassis are chargeable at 20 per cent.

Parts and detached pieces are all dutiable at 12 per cent. ad valorem, including chassis frames and their component parts, wheels with or without tires, steering rods and gear, bodies, rear axles, batteries, spark plugs, carburetors, gear shifts, differentials, dynamos, generators, motors and radiators, many of which were previously classed as machinery. Solid tires, shoes and inner tubes entirely of real or artificial rubber or combined with other material, formerly included under miscellaneous rubber products, are now classed as parts. Rough castings or forgings which cannot be employed for construction work without further shop treatment are taxed as metal work according to the material of which they are made.

Accessories, many of which formerly figured in different groups as hardware, watches and machinery, are now combined in one class comprising horns, speedometers, taximeters, lamps, headlights, watches, heaters, pumps, windshields, tool boxes, trunk racks, tire tools and the like, and are dutiable uniformly at the rate of 15 per cent. ad valorem.

GERMANY'S TRADE IN MOTOR VEHICLES.

The year 1920 in Germany, especially the first half, was characterized by a considerable business done in used motor cars, for the most part rebuilt army trucks. The continually increasing demand for such cars was attributable, in part, to the action of manufacturers in curtailing deliveries to the domestic trade, and, furthermore, to the high prices fixed for the new cars. Up to March, 1920, comparatively good prices were secured for used cars. However, the depression which set in at that time had a marked effect on this class of business. For instance, the price of used passenger automobiles at the close of 1920 was 30 per cent. lower than at the beginning of the year, while motor trucks were 45 per cent. below the January and February prices. Those dealers who stocked up heavily with used cars during the brisk period at the beginning of the year suffered considerable losses, which were increased through the enhanced cost of labor for repair work and the heightened cost of repair parts.

TRUCKS HAVE COME INTO PROMINENCE IN NORWAY.

Motor trucks have come into prominence in Norway during the past two years. The following list shows the number of motor trucks registered in the period 1913-1919: 1913, 30; 1914, 45; 1915, 62; 1916, 150; 1917, 280; 1918, 346; 1919, 863.

These cars have been imported mainly from the United States. There are a number of German trucks, but as yet the American made truck is in the lead. The heavy truck is not in such great demand as the light truck. The light delivery wagon is in good demand. The number of cars of this type registered in Norway in the period 1913-1919 was as follows: 1913, 60; 1914, 96; 1915, 137; 1916, 203; 1917, 280; 1918, 301; 1919, 501.

These cars are also for the most part of American origin. American manufacturers of this type of car might find it to their advantage to specialize in their sale.

EFFICIENCY OF TRUCKS IN JAMAICA.

The greater efficiency of motor trucks over mules and carts for heavy hauling in Jamaica is now well established. There were on hand last year four of these machines, and at the end of the financial year the number was increased to nine.

DATE OF LYONS FAIR.

The Lyons fair will be held from Oct. 1 to 15 next in Lyons, France. The fair constitutes the most important manifestation for the promotion of international trade in the world at the present time. American manufacturers will receive all information concerning the fair on application to Emile Garden, 150 Nassau street, New York.

COMMERCIAL TRAVELLERS USE TRUCKS

COMMERCIAL travellers have found that the motor vehicle saves them much time, allows them to cover greater distance and to see a greater number of prospects, thereby transacting a larger amount of business in a given length of time. Isolated towns not connected by rail are difficult to reach and in other towns connected by rail it is often difficult for the commercial traveller to make much headway or see many prospects in a day because of the poor service given by the railroads. This condition of affairs has led to the general adoption of the automobile and light truck for the use of the commercial travellers of large wholesale houses.

The use of the truck broadens the activities of the traveller and at the same time allows him to carry the samples and to demonstrate them to his customers. This method has many advantages, especially in small towns, which the traveller only reaches occasionally.

Manufacturers who send out several commercial travellers have proved beyond the question of a doubt that a neat truck of 1500-pound capacity meets their requirements and proves as economical to operate as a passenger car, as it is more likely to be used only for commercial service and not for pleasure, as is often the case when a passenger car is operated.

Truck Operated by Maker of J. A. Cigar.

A feature of this truck, operated by the Alles & Fisher Co, is the mammoth wooden cigar mounted on the top, which, by mechanical means operated inside of the truck, gives off a cloud of smoke from the white tip, which very much resembles the smoke of a regular cigar in the mouth of a smoker.

The cigar is nine feet long, is a facsimile of the original in every way and is attracting much attention, as it goes up and down the main thoroughfares, smoking incessantly.

The cigar is mounted on top of a standard Dodge Brothers car. In the interior of the car is concealed an arrangement for producing the smoke or vapor, which filters out slowly through



Dodge Truck with Unique Advertising Cigar Which Smokes as Car Passes Through Streets of Boston.

perforations in the ashes. The effect is very realistic. The advertising value of the device is increased by the mystery of the steady flow of smoke as there are apparently no pipes, hose or other connections between the cigar and the body of the car, except the flat iron braces, which are so painted as to be hardly recognizable.

The first of these cars was sold to the Alles & Fisher Co. by the Henshaw Motor Co., Dodge Brothers dealer in Boston. Mr. Henshaw holds the patents on the contrivance and already has created a demand which will undoubtedly result in many other sales, as the car on which he mounts the cigar has always been a favorite with tobacco manufacturers and dealers.

Salesmen who drive the car say it never fails to make an impression on the retailer, and thereby assists materially in making sales. This is chiefly due to the fact that the retailer likes to buy from a manufacturer who advertises extensively and this novelty is a good indication of unusual activity in this line.

The principle of the cigar is also being applied to other lines of business the

product of which is a smoke, steam or vapor producing article.

TRUCK CARRIES SALESMAN'S COMPLETE EQUIPMENT.

T. I. Todd, dealer for the National Cash Register Co., in the Tampa, Fla., district, has always been a faithful believer in thorough demonstrations to accompany his sales talks to prospective buyers. Consequently he is thoroughly equipped to demonstrate.

Mr. Todd bought a standard Dodge Brothers screen side business car from the Ferman Motor Car Co. of Tampa and by means of a few inexpensive fixtures fitted it out in a way that scarcely ever fails to get interest which, as all salesmen know, is the first requisite of success in salesmanship. The appearance of the car itself, with its folding and sliding devices used in displaying cash registers, credit files, etc., is in itself enough to induce the most chronic cases of "deferred action prospects" to step out in front of their stores for a moment to see what the salesman has to offer.

With this equipment Mr. Todd quickly travels from store to store and town to town, ready on a moment's notice to display and operate any type of cash register or credit file in which the merchant may be interested. It would be utterly folly to ask this salesman to abandon his present equipment and go back to any of the old methods he formerly employed.

DODGE TRUCK USED IN OIL FIELD SERVICE.

Light trucks have proved very popular in the oil fields for conveying quickly and safely supplies to the crews of well drilling outfits. The crews require that blasting supplies be brought to them at intervals in their work and often these supplies must be hauled from a distance. The Dodge Brothers car shown is used for hauling the supplies and on account of its light weight and power is able to negotiate the poor roads which abound. The truck carries a full outfit for the



National Cash Register Salesman Finds Dodge Truck Increases Business, Allowing Him to Demonstrate Equipment Direct to Prospects.



Dodge Trucks Prove Popular in the Oil Fields Conveying Explosives, Etc.

blasting crew and is kept loaded and ready for immediate service in any part of the field where drilling is under way.

ACME MOTOR TRUCK SOLVES WATER PUMPING PROBLEM.

The Moon Lake Ice Co., Grand Rapids, Mich., in completing the erection of a new building demanded by its rapidly expanding business, came face to face with a problem a few days ago which for a time kept the contractor in charge guessing as to what to do.

At one end of the new building a well had been sunk which it was hoped would produce enough water to furnish the large supply needed by the company in running its ice making equipment in full operation. To determine whether the volume of water was sufficient for the purpose it was necessary to put in a pump for operation by motor. The contractor was at a loss to know how to accomplish this without installing a special motor. The superintendent in charge, however, overcame the necessity of putting in a temporary motor by using a motor truck, as shown in the accompanying illustration.

One of the 3½-ton trucks in the Moon Lake Ice Co.'s Acme fleet was commandeered for the purpose, the rear end was raised on blocking, belt attached to pump from rear wheel, and the 45-horsepower, 4½ by 5½-inch truck motor was called upon to do the pumping.

The combination worked out splendidly. The centrifugal pump drew 350 gallons of water a minute. The test ran over a period of more than a week with an average of six to seven hours pumping in each 24. At the end of this time the Moon Lake Ice Co. was thoroughly satisfied that the well would stand the test, particularly as the truck motor exacted even greater requirements than the regular pump motor would be called upon in the course of daily operation.

The truck which responded to the emergency so satisfactorily is an Acme 3½-ton model, equipped with a special ice body which the Moon Lake Ice Co. has adopted on all its trucks because of convenience and utility in ice handling. The body is composed of a steel frame

with steel ribs, wooden panels, with face of steel ribs, where they intersect with wooden panels covered with leather strapping. This prevents the ice from coming into contact with the metal surface.

For convenience in unloading ice sections a side opening is provided with a pivoted door operated by spring control levers. One of the two coil springs keeping the door in place is seen at the right of the lever.

The trucks and the body equipment have proved so satisfactory that the Moon Lake Ice Co. is motorizing its entire equipment as fast as possible. It has now two 3½-ton trucks, a one-ton and a two-ton, the four trucks having operated over 25,000 miles, with repairs of less than \$75. During the present season two additional two-tonners and perhaps a one-ton truck will be added to complete the Moon Lake Ice Co.'s equipment.

MACK TRUCK SALES HEALTHY.

The current year's sales of the International Motor Truck Corporation show a substantial volume, estimated to be nearly 85 per cent. of the gross 1920 figures when gross sales totaled \$34,000,-

000. Highly gratifying progress has been made in reducing inventories and in the first four months of 1921 there was an actual reduction of \$2,000,000. By June 30 the net reduction will amount to more than \$3,000,000. No commitments have been made for incoming raw materials beyond those sufficient to meet current manufacturing requirements. It is expected that by July 1 the finished truck inventory will be down to a normal total based on the present volume of business. This means that manufacturing operations at the three plants will have to be increased soon after July 1 to a rate approximating sales. In order to bring down truck inventories, operations since January have been at a smaller rate than monthly deliveries of trucks.

The International Motor Truck Corporation continues in the strongest financial condition. It has no bank loans whatever and its cash balance approximates \$4,000,000. The company came through March without any losses in net profits and there was a slight margin above depreciation, taxes and all other charges. Business now is running at approximately double the seven per cent. dividend requirements.

H. K. YORK EXECUTIVE OF INDIANA TRUCK CORPORATION.

Announcement comes from the Indiana Truck Corporation of Marion, Ind., of the recent promotion of Homer K. York to the position of assistant secretary and treasurer. Mr. York has been at his new duties since April 1. He has been supervisor of production and service of the Indiana Truck Corporation for the past four years.

G. M. C. MAY BUILD CUSTOM BODIES.

The plant of the Dayton-Wright Airplane Co. may be turned over to the General Motors Corporation in the near future for the building of bodies. It is said that the plant is not large enough to admit of quantity production, but is ideally laid out to manufacture custom bodies.

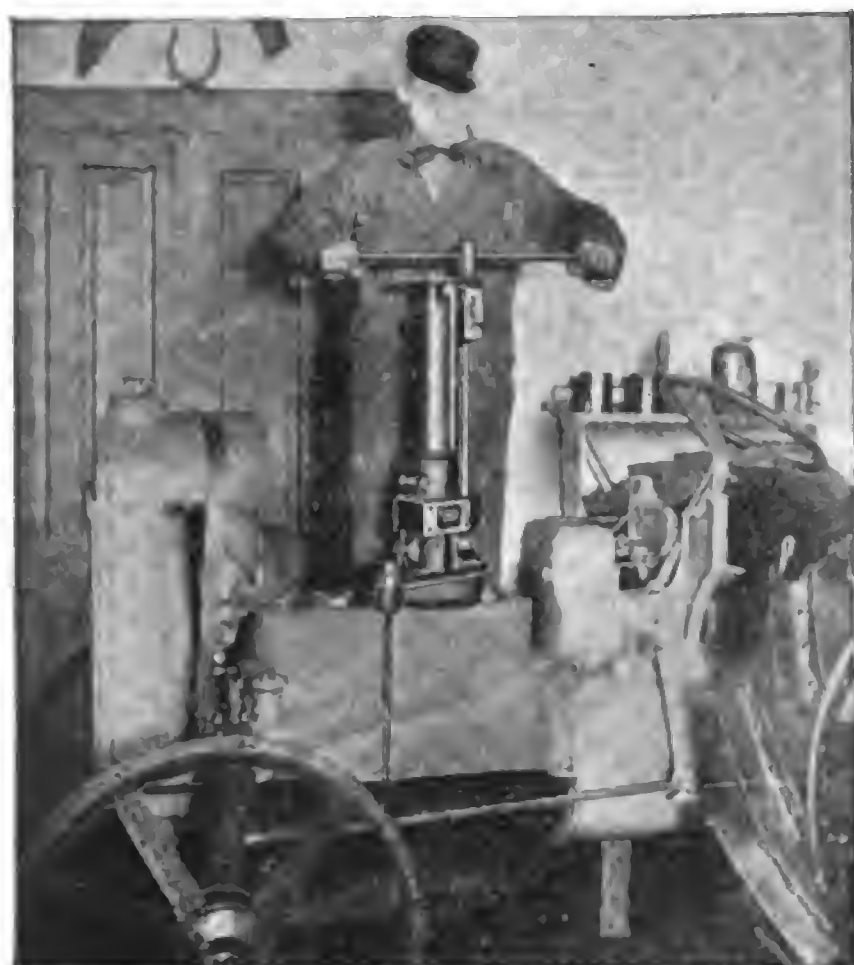


Acme 3½-Ton Truck Furnishes Power for Testing Artesian Well for Water Flowage.

Garage and Service Station Machinery Tools and Equipment

STORM "TYPE M" REBORING MACHINE.

The Storm Manufacturing Co., Minneapolis, Minn., is offering a new rebor-



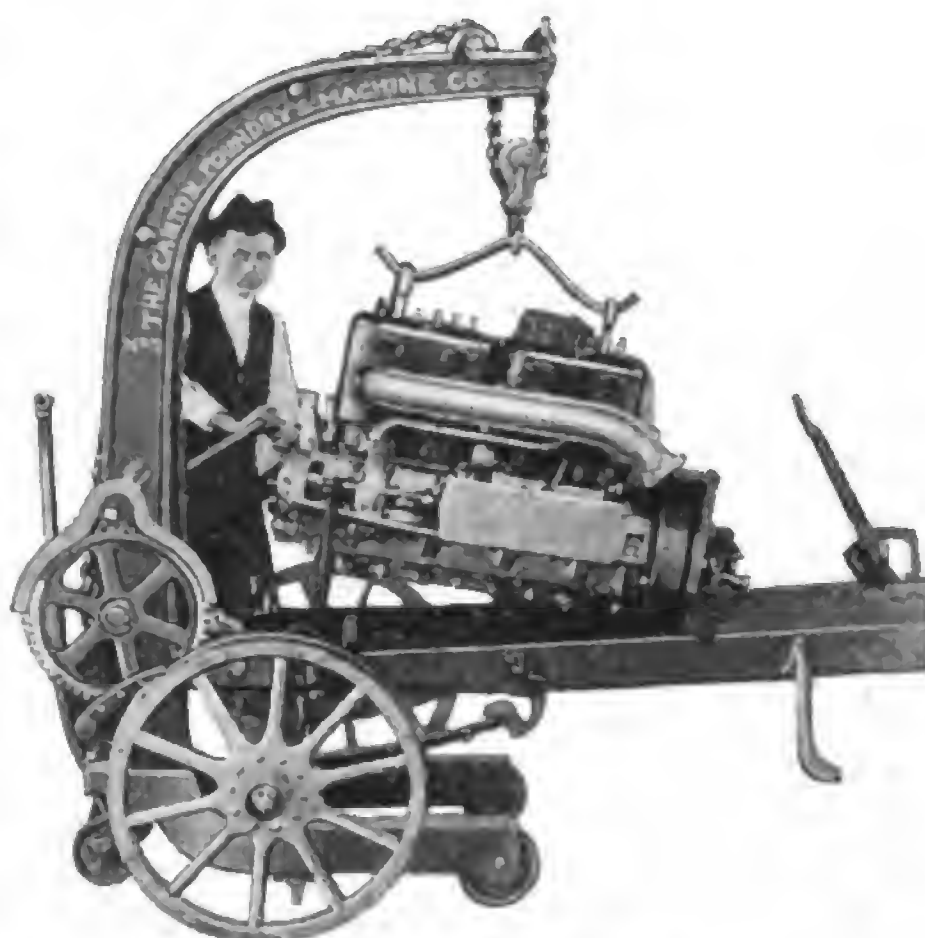
ing machine which possesses a number of unique features, making it especially adaptable to the needs of service station and fleet owners who desire to rebores the cylinders of motor truck engines.

The main body is a one-piece, heavy casting which supports the boring bar, feeding and driving mechanism. The construction provides two heavy, adjustable bearings in which the boring bar operates. The boring bar is of hollow

The cutter heads are of the well known Storm Patented Six-Cutter type, which have universal adjustment by means of a center cutter adjuster, so that they cut to any desired size within the capacity of the machine.

NO. 3 LOW BED CANTON PORTABLE CRANE.

The Canton Foundry & Machine Co., Canton, O., is showing its latest portable crane, which is adapted to many uses in the motor truck service station. A crane of this type is especially serviceable in hoisting engines from truck frames, lifting rear or front ends and kindred uses.



The crane is mounted on three rollers, one of which is a caster, allowing the crane to be moved to any part of the station for work on individual truck units. It is claimed that with this outfit the handling of motor truck repair work can be speeded up so that seven or eight men may be displaced.

Canton portable cranes are made of semi-steel throughout, all intricate parts are of high quality drop forgings and they are equipped with hand forged, tested and guaranteed BBB chain and Hyatt roller bearings, a feature which increases their ease of operation to a great degree.

MANLEY SERVICE STATION CRANE.

Manley Manufacturing Co., York, Pa., is emphasizing the adaptability of its portable floor crane for such outside work as towing disabled cars, pulling cars out of ditches, raising rear ends of disabled cars on the road, providing an opportunity for replacing damaged parts of the rear axle, etc. The crane is easily

mounted at the rear of a service truck and transported quickly to any point where its work is necessary. The crane is made throughout of structural and flat steel mounted on wooden sills, is provided

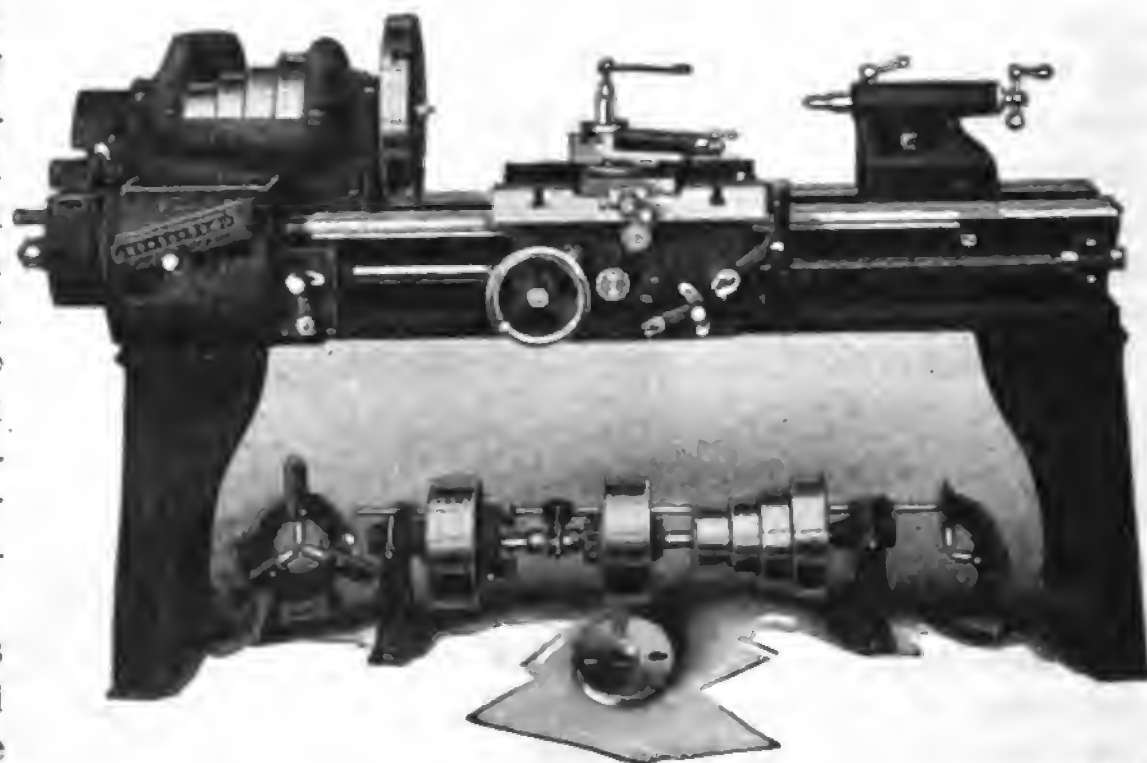


with reduction gears, drum hoist and chain, which allows a wide variety of usages.

For shop work, provision is made for mounting the crane on rollers, which allows it to be moved readily about the shop for such purposes as lifting engines from car frames or from engine stands, lifting either front or rear of cars, etc.

NEW 14-INCH QUICK CHANGE GEAR LATHE.

The Carroll & Jamieson Machine Tool Co., Batavia, O., is now in production with a new 14-inch quick change gear lathe equipped with either single or



double back gear. The lathe has a 15½-inch swing and is guaranteed to meet all the requirements of the service station, or tool room, and will manufacture parts up to the full capacity of any 14-inch lathe.

It is equipped with the maker's patented quick change gear box, cutting threads from three to 64 an inch. One handle and knob does it all.

Attachments that can be purchased with this lathe include milling and keyway cutting attachment, taper attachment, patented increase swing attachment, draw-in chuck attachment. Special garage equipment, including lathe tool holders, cutting off tools, boring tools, chucks, lathe dogs, etc., is furnished at small additional cost.



carbon steel, hardened and ground, and having a travel of 14 inches. The bar is actuated by means of cut spiral gears and the feed is obtained through heavy internal screw and upper feed gears as shown. The bar supports the cutter threads, which are not shown.

New Motor Truck Accessories

FORC-FUL-LUBRICATOR.

The I. C. Manufacturing Co., Chicago, Ill., sales department of the Zinke Co., 1323 Michigan avenue, Chicago, announce a new production which is known by the



trade name, Forc-Ful-Lubricator, designed to provide positive lubrication of light and medium capacity trucks. The old compression cups are removed and the special threaded nipples screwed in their place. A special screw pressure gun is supplied which has a male end fitting the threads of the nipples, allowing heavy oil to be forced into the bearings under heavy pressure. It is stated that the pressure is heavy enough to force out old lubricant, dirt and dust and deposit the new lubricant in the center of the bearings.

FANSTEEL MAGNETO BREAK TIMER.

A new timer which has been designed for the Ford passenger car, truck and

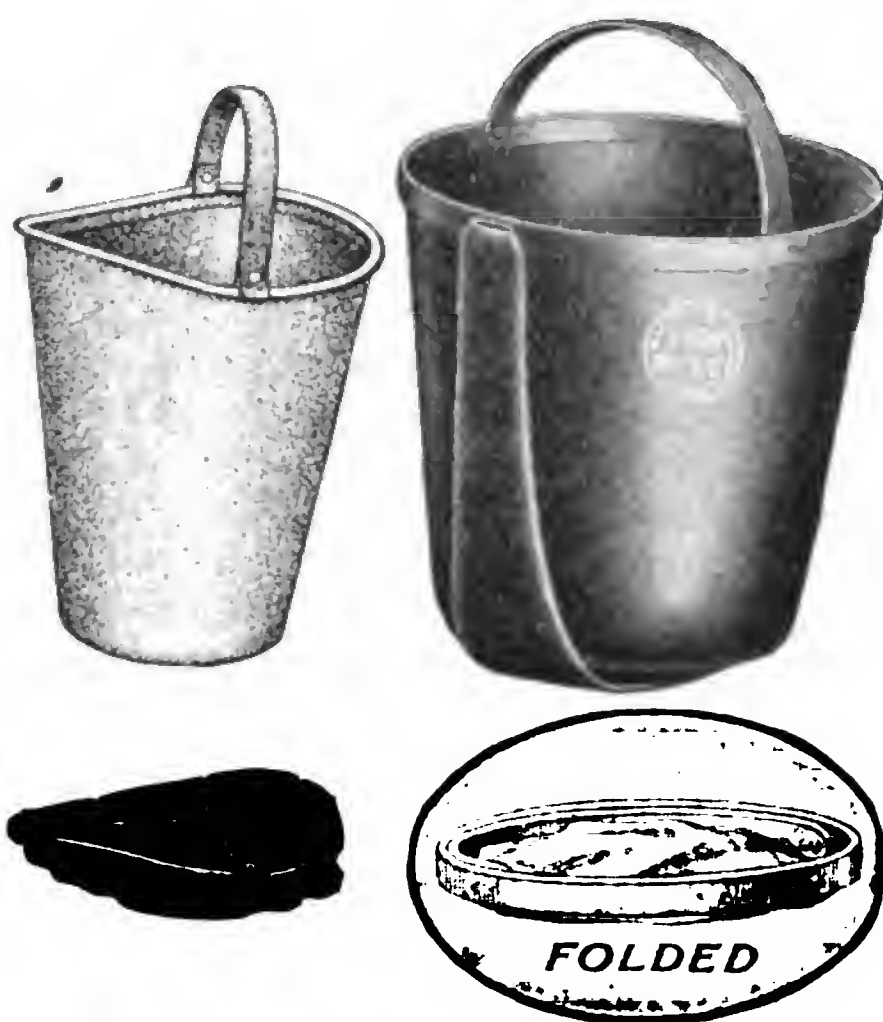


Fordson tractor is being manufactured by W. J. Walsh, 528 Monadnock block, 53 West Jackson boulevard, Chicago, Ill.

The new timer has heavy tungsten contact points and the parts are of rust proof construction, as they are heavily coppered and the housing is covered with shellac. The timer is so designed that oiling is not necessary as contact is not made through a rotating part, but instead, steel rolls follow the contour of the cam and make contact with the points through hinged arms. The manufacturer guarantees that any difficulty which may arise, due to defective workmanship or material, will be adjusted at his expense.

BOKO BUCKET NO. 1500.

The Bailey-Drake Co., Inc., 1120 Michigan avenue, Chicago, Ill., is handling sales for the Defiance Welding Co., Defiance, O., manufacturer of a line of collapsible buckets which every motor truck operator should wish to carry on the truck. Oftentimes it is necessary to replenish the cooling system by taking water from a roadside brook or watering trough, or to supply fuel to the fuel



tank, and a Boko bucket is designed especially for this work.

The bucket is constructed of gasoline proof fabric, double sewed and tightly cemented. When not in use as a funnel the flexible tube fastens over the top. A slight pressure of the finger gives perfect control of the flow, preventing spilling or waste of the liquid.

Boko buckets have a capacity of two gallons and may be folded and placed in the tool kit or under the seat.

GOODYEAR SOLID TIRES TO HAVE ALL-WEATHER TREAD.

To meet the demand of motor truck users for a solid tire that will provide positive traction, the Goodyear Tire & Rubber Co., Akron, O., has developed and is now producing a new type, embodying the non-skid principle of the pneumatic tire.

This tire, the Goodyear All-Weather

Solid, has an unusually large cross sectional area, giving it added height to increase cushioning and prolong wear. The tread is crossed diagonally with deep grooves, permitting the large diamond shaped blocks, characteristic of the Goodyear All-Weather Tread design, to secure a firm grip on the road.

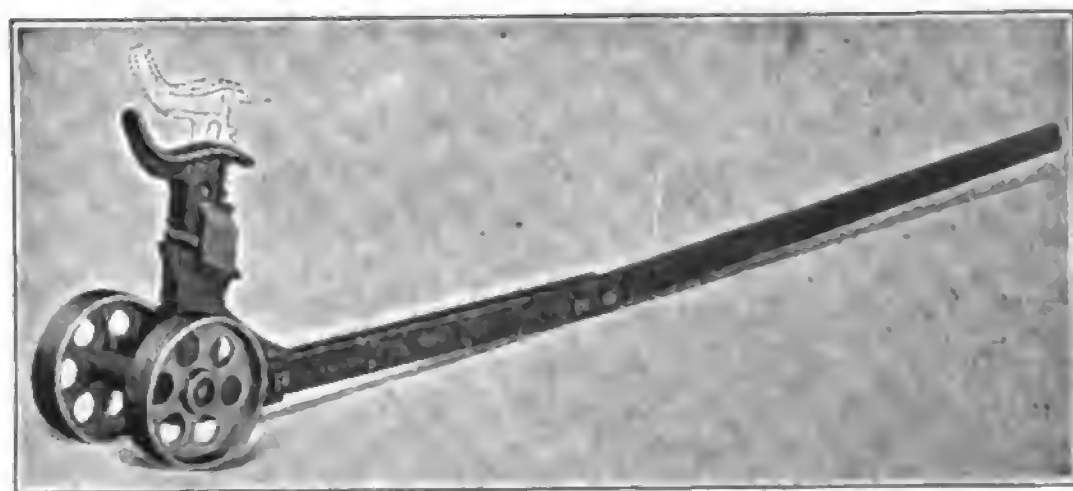


Besides increasing traction value, the blocks of the All-Weather tread add to the cushioning capacity of the tire by absorbing minor shocks before they reach the body of the tire.

The All-Weather Tread type solid is made in six inch, seven inch, eight inch, 10 inch and 12 inch sizes, the tread blocks being graduated according to the width of the tire.

NO. 3 HOVEY JACK.

J. H. Whetstone & Co., Lapeer, Mich., is showing a new jack which is especially designed for use in the service station in raising or lowering front or rear ends and moving either end of the car in close



quarters. The jack is stated to combine the principles of strength and speed, as well as appearance, at a low price. It is so constructed that it can be used under a rear axle equipped with a truss rod without interference. It is equipped with an improved locking principle, which overcomes any possibility of the handle flying up until lifted by the operator. The handle is so designed that it clears the floor at its extreme end sufficiently to allow plenty of hand room. There are no delicate springs or parts to get out of order.

NEW MOLINE ENGINE CO. TO BE FORMED TO MAKE MOTORS

The formal organization of the Moline Engine Co. is soon expected at East Moline, Ill., which will manufacture Knight motors for the R. & V. Motor Co., in addition to its established business of the production of poppet valve engines. All capital stock will be held by the Root & Van Dervoort Engineering Co., which then becomes merely a holding concern. The automobile business has already been separated and organized as the R. & V. Motor Co.

The Moline engine, it is announced, will expand its business and expects to have an annual production valued at approximately \$15,000,000. This will not curtail the R. & V. plant activities, but result in centralization of the two units, into which the main organization has been divided. Rumors of the control of the engine division of the plant by the Continental Motors Corporation are denied by company officials in connection with this change.

Directors of the three R. & V. industrial corporations recently elected have chosen the following officers: President, H. A. Holder; vice president, G. A. Shallberg; secretary-treasurer, S. G. Smith; assistant secretary-treasurer, G. L. Walker. C. H. Van Dervoort was elected a vice president of the motor company and will have charge of the sales. In addition to these officers the directors include O. J. Root, Rufus Walker, Jr., R. S. Hawes, J. W. Reinholdt, S. A. Mitchell and D. W. Gurnett.

REIMPORTED TRUCKS TO BE SUB- JECTED TO TARIFF.

That reimportation of American made motor trucks shipped to foreign countries for war usage during the last few years would work harm to the business of dealers and manufacturers has long been an accepted fact and it is interesting to note that Congress is giving somewhat delayed heed to the matter. Representative Fordney, chairman of the Ways and Means committee of the House, has indicated that when the permanent tariff is framed adequate protection will be given the automotive industry by the insertion of a specific clause in the anti-dumping provisions of the measure.

No attempt will be made to bar out of the country these American made trucks, but it is proposed to enact valuation clauses which will put them on a fairly competitive basis. The chief danger now is that so many of them will be brought into the country before the permanent tariff is enacted that it will be a case of locking the barn door after the horse is stolen.

It is expected, however, that the Ways and Means committee will report the permanent tariff bill in a few days. Practically all legislation is at a standstill pending solution of the tariff.

An inventor is said to have perfected a workable gasoline turbine motor.



Alfred Reeves, General Manager of N. A. C. C., Elected President of Trade Organization Secretaries

NEW HONOR FOR REEVES.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has been elected president of the Trade Organization Secretaries of New York, which consists of the executive officers of more than 80 trade organizations.

The association holds monthly meetings to discuss problems which have to be met by organizations of manufacturers, wholesalers and retailers.

SPECIAL TAX ON CARS AND TRUCKS.

All who are engaged in manufacture or importation of passenger cars, trucks, tires or accessories will be called on to pay an annual tax of 20 pesos and a sale tax of five per cent. if a bill to be presented to the Philippine legislature becomes effective. This bill includes virtually the same conditions and is apparently based on title nine of the United States revenue act of 1913.

MACFARLAND JOINS BASSICK CO.

Hayes MacFarland has been made sales manager of the Bassick Manufacturing Co., Chicago. He has been in the automotive industry for many years.



George H. Daugherty, Vice President of Johnson, Read Advertising Agency.

WARNER HAS RESIGNED FROM GENERAL MOTORS TO JOIN DURANT

News of importance to the trade comes in the announcement that T. W. Warner has resigned from his connection with the General Motors Corporation and will join the Durant Motors Corporation as vice president.

The T. W. Warner Co. and the Warner Corporation at Muncie, Ind., of which Mr. Warner is now president, will be kept independent units, but will be associated with Durant Motors in the manufacture of transmissions, steering gears and other parts for the new cars. In joining forces with Durant, he is renewing an intimate association which has continued for years.

K. W. Zimmerschied, who is at the head of the entire Chevrolet organization, will succeed Mr. Warner as president of the Toledo Chevrolet company. The retirement of Mr. Warner from General Motors will involve no actual change in management, as he has merely been the nominal head of the two companies.

Mr. Warner is one of the pioneers of the automobile industry. In 1901 he had a gear factory at Muncie, Ind., which was sold in 1929, when he came to Toledo and started the Warner Manufacturing Co. In 1916 this was merged with the Toledo Chevrolet company, a division of the General Motors Corporation, manufacturing transmissions for Chevrolet cars. He organized the Warner corporation about two years ago. He is rated as a millionaire and his active reentry into the manufacturing field will add much strength to the Durant organization.

The General Motors Corporation has issued the following statement in regard to the resignation of T. W. Warner:

"The General Motors Corporation announces that K. W. Zimmerschied, president and general manager of the Chevrolet Motor Co., has accepted the resignation of T. W. Warner as president of the Toledo-Chevrolet Motor Co. of Toledo, a subsidiary manufacturing transmissions.

"The corporation also announces that Mr. Warner's resignation has been accepted as president and general manager of the Muncie Products Corporation of Muncie, Ind., one of the units of the Inter-Company Parts Division of General Motors Corporation.

"Mr. Warner was not an officer nor a director of the General Motors Corporation."

DAUGHERTY VICE PRESIDENT JOHN- SON, READ & CO.

For 10 years George H. Daugherty has been associated with many of the largest advertising campaigns on motor trucks, agricultural tractors and passenger cars. He has a large acquaintance among the men of the automotive industries who will be interested to learn that he has been elected a vice president of Johnson, Read & Co., advertising agency of Chicago, with which Mr. Daugherty will continue the work on which he has so successfully specialized.

NEW CLASSIFICATION OF RATES ON RUBBER SHIPMENTS.

The new classification of freight rates on shipments of rubber and rubber goods are of interest in the motor truck industry. The new rates went into effect May 25, are contained in supplement No. 2 to consolidated freight classification and are as follows:

Artificial Leather or Auto Top Material—Second class rates on shipments in any quantity have heretofore applied to southern points, but effective May 25, rating will be fourth class in car load lots.

Crude Rubber—Shipments of crude rubber to points in the South have been rated third class in any quantity. This rating has been changed to second class less car loads and fourth class in car loads.

Pneumatic Tire Valves—This article has been rated at first class in any quantity in all territories. Car load rating of third class with a minimum car load weight of 40,000 pounds has been established to points in official and western classification territories. The rating under the southern classification is unchanged.

Pneumatic Tires Less Than Car Loads in Wire Bound Bundles—First class rating has been established on pneumatic tires, less than car loads, in wire bound bundles to and between points in the South instead of $1\frac{1}{2}$ times first class rates.

SHORT-SIGHTED LEGISLATION OUTLAWES EVEN TWO-TON TRUCKS.

The New Hampshire Legislature has passed a law raising the tax on a two-ton truck from \$15 to over \$200.

By logging otherwise inaccessible timber tracts and other means, trucks have proved valuable as railroad feeders in that section.

Would not this be a good example to cite to the railroads, showing them that the motor truck is really their asset?

An example. For several years prior to 1916 the income of the Boston & Maine was gradually dwindling. Since then it has increased steadily. The income in 1920 was over 60 per cent. greater than during 1915.

It is at least significant that the income of the Boston & Maine began to increase about the same time that motor transport began to make itself effective.

How much of the increased income is due to motor truck feeders?

NEW YORK LEADS IN ROAD SURFACES.

The city engineer of Perth, Australia, who recently visited Wellington (New Zealand), Newport News (Virginia), New York, Halifax, Brussels, Antwerp; London and many of the larger provincial cities of England and Scotland, declares, in a report to his municipal council, that New York undoubtedly leads the world today in the use of the very latest and best types of pavements for motor vehicle traffic.

Importance of Organized Transportation Methods

(By F. S. SPENCER, Spencer Reed Co.)

A SMALL raise in freight rates will cause protests from one end of the country to the other. Yet retailers and manufacturers can, through disorganized delivery methods, lose more money than they pay out in increased freight charges.

Delivery was a "hit or miss" operation in the days of the horse, and the truck has come so rapidly that only a few business men have realized the necessity of organizing their transportation as efficiently as they have organized their shops or stores.

Those few have gained a profit in reduced hauling costs. More than this, they have brought dependability into their transportation systems. And transportation is the most important factor in any business.

No matter how good an article may be, or how cheaply it can be manufactured, the merchandise has no economic value until it is placed in the hands of the user, and this must be done without waste or unnecessary expense, or legitimate profits will be sacrificed. Many a dollar that's saved in the shop is lost on the road.

So the vitality of American industry—the future of the nation itself—is essentially dependent on the establishment of efficient transportation methods. The secret of this solution lies in standardization and organization, the same factors that took the waste and expense out of railroading.

American history really began with the invention of the railroad. Freight trains were swifter and cheaper than the horse drawn caravan. The railroad built the wilderness because it brought supplies to the points where they were needed.

But a greater step was taken when the railroads were standardized. Narrow gauge roads were torn up and replaced with the newer types until the nation's network of railroad tracks were of standard gauge. A train could travel uninterruptedly from New York to San Francisco, from Minneapolis to New Orleans. Time and money were not wasted in shifting loads, the freight was delivered to point of destination in its original car. Men could work anywhere in the country because they were handling the same types of locomotives and cars.

This was standardization, the brain child of the master minds of transportation. It was made possible through organization of the forces of traffic. No one today would willingly return to individualism in railroading.

Truck Grappling with Problem of Transportation.

The motor truck hides on city streets and country roads, and that is all that distinguishes it from the railroad. Like the pioneer railroaders the truck is grappling with the great problem of transportation. It is fighting the handicap of space—spanning the chasm between "here" and "there."

The truck problem is the same as that of the railroads and therefore can profit by their experience. Trucks of the same make and trucks selected to fit individual needs—these are the things that will help batter down the overhead by reducing transportation costs.

Owners can accomplish many economies by keeping the truck fleet of the same make. Maintenance costs can be gauged by a comparison with a definite standard of average cost because each unit involves identical conditions. Drivers are interchangeable and there are no discordant jealousies over who gets the best truck to drive. Repairs are easier to make since the repair man is working on a single type of truck and becomes familiar with it. Interchangeability of parts often prevents delay.

So much for transportation organization insofar as it affects the unification of the fleet. But before the trucks are bought it is necessary to decide what sizes to select. This calls for an expert knowledge of transportation efficiency problems which is impossible to secure without specialization and intense study. No merchant or manufacturer can afford the time necessary for this study. Yet the problem must be solved.

Motor truck manufacturers long ago realized the coming importance of motor truck transportation and the necessity of correct equipment for doing the work at lowest cost.

Kissel saw that building a truck embodying the highest mechanical and engineering skill would not be sufficient. A truck must be more than good—it must be the right truck for the job on which it is used. The customer is not buying so many pounds of iron and steel. He is buying ton-miles of transportation service and to get this at lowest cost he must have back of his truck an organization of trained transportation experts who can competently advise in the selection of equipment.

The equipment recommended varies with the nature of the business, with the size of the loads, the frequency of stops, the hills in the route—with many things which are not considered by the man or corporation that sells only a truck.

If a truck is too large the owner is losing money; if too small he is straining the truck to the point of excessive depreciation. It may be that an owner is losing money with three small trucks, when he should be using one large one for the long or heavy hauls and a light truck for the pick-ups.

In the language of the golfer "you can't putt with a mashie and expect to beat bogie."

Walter S. Bingham has recently been appointed representative of the Arvac Manufacturing Co. in Michigan, Wisconsin, Minnesota, Iowa, Illinois and Missouri. He has been connected with the tractor industry in the northwest.

NEW DISTRICT MANAGERS APPOINTED FOR BLACK & DECKER

The Black & Decker Manufacturing Co. of Towson Heights, Baltimore, Md., announces that they are now represented in Pittsburgh by D. C. Paul, formerly of Gaul, Derr & Shearer Co. of Philadelphia. The Pittsburgh branch, of which Mr. Paul is manager, includes western New York, western Pennsylvania and the northern part of West Virginia.

The Pittsburgh office is located at 303 Penn avenue, where there is also a completely equipped service station with a factory trained service man in charge. Mr. Paul has assisting him Frank E. Maric and J. A. Miller.

J. N. LaBelle, formerly assistant manager of the Chicago branch of the Black & Decker Co., has been made manager of the Kansas City branch, recently opened. This branch includes supervision over the Kansas, Nebraska, Oklahoma, Texas, Arkansas, western Louisiana and western Missouri territory. Mr. LaBelle will be assisted by Emery Harris, who will make his headquarters at Omaha, Neb., and R. Brice Shipley, who will travel in Oklahoma, Texas, Arkansas and western Louisiana.

The Black & Decker Co. also announces the appointment of Thomas W. Peters as manager of the new Atlanta branch office, which has been opened at 1508 Candler building. Mr. Peters will have charge of all southeastern states, including Virginia, Tennessee and Mississippi.

ANNUAL MEETING OF WHITE COMPANY STOCKHOLDERS.

At the annual meeting of the stockholders of the White Motor Co., Cleveland, O., the stockholders elected the following directors: E. R. Tinker and Walter C. Teagle, New York; Philemon Dickinson, Philadelphia; William G. Mather, J. R. Nutt, Warren S. Hayden, Otto Miller, Homer S. Johnson, Albert R. Warner, Windsor T. White, Walter C. White and Thomas H. White, all of Cleveland.

The addition of Messrs. Teagle and Mather gives to the board the benefit of their wide business experience and materially broadens the representation of various industries in the directorate of the company.

At the organization of the new board, Windsor T. White asked to be relieved of his duties as president, which office he has held since the company was organized, and stated that E. W. Hulet, the second vice president, and Mr. Warner the secretary, also desired to retire from active connection with the company. Mr. Hulet has been with the company over 20 years. At the request of the board he has consented to remain in an advisory capacity so that the benefit of his long years of successful factory management will still be available to the company. Mr. Warner has been with the company for 17 years and terminates his active connection with it to the re-



J. N. LaBelle, Manager of Kansas City Branch of Black & Decker.

gret of the management and the board of directors. He remains a member of the board.

The directors elected Windsor T. White, chairman of the board; Walter C. White, president; Thomas H. White, vice president in charge of production; George Kelly, treasurer, and T. R. Dahl, secretary. The executive committee is composed of Windsor T. White, Walter C. White, Thomas H. White, Homer H. Johnson and Otto Miller.

A dividend of \$1 a share was declared, payable June 30 to stockholders of record June 15.

SHEARMAN WITH COLLIER MOTOR TRUCK CO.

E. D. Shearman has been made secretary and a director of the Collier Motor Truck Co. Bellevue, O. Mr. Shearman was one of the organizers of the Salisbury Wheel & Axle Co. and was its general manager until it was sold in 1919.



D. C. Paul, Manager of Pittsburgh Branch of Black & Decker Co.

GARFORD EXPANSION WILL TRIPLE PRODUCT OF FACTORY

One of the largest and most important expansions made in the automotive manufacturing field during the last year was that of the Garford Motor Truck Co., Lima, O., which recently completed a modern progressive assembly plant and office building.

The new unit in the group of Garford factories increases the floor space to 14 acres, with machinery and equipment which will more than treble the production capacity of the institution.

The building is two stories high and is constructed of concrete, steel and glass. The assembly division is 420 feet long and 100 feet wide, with a basement 532 feet long and 100 feet wide. One section of the basement extends under the office department. The total basement floor space is 53,200 square feet.

Three progressive chassis assembly lines with moving chain conveyors virtually revolutionize the Garford assembly system. Chassis parts are stored in progressive order along these lines, where they are quickly available to the main production channel. The engines are stored on gravity roller conveyors and are assembled on conveyor tables. Seat boxes, transmissions, axles, wheels and a similar sub-assemblies are made in departments arranged along the assembly route at the points where they are placed on the chassis.

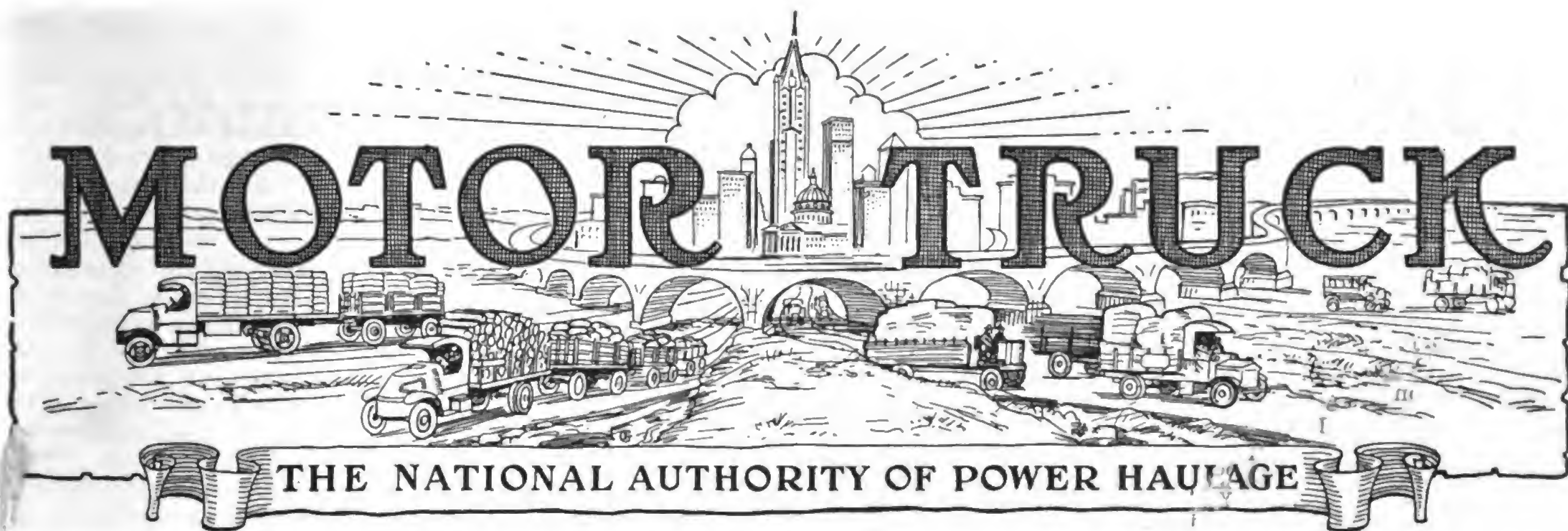
A long slate conveyor performs dual service in carrying material and parts from the receiving room to the assembly "stores" and in hauling them to their proper locations in the basement warehouse from which they are removed, as needed, to the assembly floors by electric hoists operated through shafts in the floors. Overhead trolleys convey parts to their places along the assembly lines. The entire assembly division is the "daylight" type, having glass sawtooth roofing.

The office section is composed of two floors, 132 by 100 feet, each of which comprises 13,200 square feet of floor space. This section has made possible a more convenient arrangement of the general and departmental offices to facilitate the handling of routine commercial traffic.

The location of the new addition is such as to give the complete factory group a uniform architectural appearance and permit an impressive landscaping of the entire Garford property, which embraces 34 acres in the south suburbs of Lima. It is equipped throughout with modern conveniences and devices which enable the employees to work under the most sanitary and comfortable conditions.

PRICE OF ACE TRUCK REDUCED.

The American Motor Truck Co., Newark, O., has announced reductions in its various Ace models. They are as follows: \$455 or 16½ per cent. on the 1½-ton; \$655 or 23½ per cent. on the 2½-ton; thus making the 1½-ton \$2295 and the 2½-ton \$2795.



OL. XII. NO. 7.

PAWTUCKET, R. I.

JULY, 1921.

Profiting by Précedent

WISE DISTRIBUTORS CASH IN ON SATISFACTION—SUCCESSFUL BECAUSE THEY WORK BY 1921 RULES AND HUSTLE FOR TRADE. "THE MAN WHO WHISPERS DOWN A WELL ABOUT THOSE TRUCKS HE HAS TO SELL, WON'T REAP THE SHINING GOLDEN DOLLARS LIKE HE WHO CLIMBS A TREE AND HOLLERS."

"YOU and an owl belong in the same class for looking solemn," observed the tired tire salesman, as he deposited his expensive Panama hat in a convenient chair and gave the truck dealer a moist hand and a doubtful cigar

(By S. G. SWIFT.)

in greeting. "What's the matter?" he asked, mopping his perspiring forehead with a billious tinted handkerchief.

"Huh," grumbled the dealer, biting off

the end of the weed and blowing through it before lighting it. "It might make you feel a little solemn if you had these bills to pay instead of always drawing your salary and 'suspense' account from a postoffice box. You fellows who have

**THE STAR
SALESMAN**

**DEALERS -
PUT UNCLE SAM ON
YOUR
SALES FORCE**



nothing on your minds but your hat can supply the sunshine for the world," he continued. "It's us who bear the burdens that'll furnish the rain."

"Just what seems to be the reason for this sudden gloom?" asked the salesman. "Why the hanging of the crepe? You always had plenty of money to pay your bills—and a lot more besides if you ask me," he finished, gazing significantly at the handsome touring car that stood in front of the salesroom.

"I got it now, too," admitted the deal-

The dealer thought a moment. "Well," he said finally, "I'll admit that I've thought a lot on the lines you mention. You know there used to be a time when we had them lined up away ahead. I've sat right in this office and seen orders for 15 trucks right in my files and more coming. I sold close to 300 Powertrucks last year, you know. Don't look as though I'd go half that many this year though," he concluded, gazing abstractedly out of the window.

"You will if you go after them right

about it though. What's your plan. Don't beat around the bush any longer, but spring it. We're using up this writer's time and he wants to go to lunch. Let's have the plan. I'll try anything once."

"I'm coming to the plan right now," answered the salesman. "It's simply this. Have your salesmen call on those same people you sold the trucks to last year."

"Let the salesman appear to be calling on the owner in a friendly way. He can ask permission to ride on the truck, in order to observe how it is working. The owner and the driver will both be pleased at his interest. He will soon know whether the customer is in the market for a new truck or not."

"But that isn't the big idea. The main issue is to get the driver, and the owner as well, working for you. In the course of their travels they undoubtedly run across a great many business houses and individuals that may be in the market for a truck. They will be glad to speak a word for your truck if you make them your friends. The salesman can do the rest."

"That's only part of the plan. You can also send a letter to the owner of the truck saying that he will be given a prize for every prospect sold that was mentioned by him. Get out a good letter, have it printed on good paper and send one to each owner of a truck sold by you. Make the prize anything you want to—a set of spark plugs, an inner tube, a set of chains or something like that. You can afford to all right. What do you think of that for a plan?"

"I said I'd try anything once and I will," said the dealer by way of answering the question. "I'll tell you how it works out when you make your next trip in about a month."

* * * * *

The stars are supposed to indicate that a month has elapsed and the salesman is again calling on the dealer. He is wearing a new suit and an air of expectancy. The dealer greets him and they enter the office of the garage. Now go on with the story.

"How'd my plan work out," asked the salesman, after they had gone over the very important business of booking the monthly order for tires. "According to the size of this order I stand pretty good with you," he said, pocketing his order book with an air of satisfaction.

The dealer smiled. "Best plan I ever tried. Working like a charm. Sold five trucks since you were here and I guess there's as much more business in sight for this month."

"Sales force waking up, 'eh?" asked the salesman.

"Never know 'em for the same boys," beamed the dealer. "All working and making money—everything going smooth and the overhead is taking care of itself. Here—have a cigar," proffering a smoke that had set him back 25 cents.

"No thanks," laughed the salesman. "I still smoke the Sandow. Best cigar made. Better have one—same kind Gen. Grant smoked—"

"No wonder he died," grunted the dealer, lighting a match on the convenient trousers of an apprentice boy who was passing with a can of grease.

J. C. SMITH—POWERTRUCK COMPANY.

"We Serve Service."

Freetown, La.

June 21, 1921.

Dear Sir:

Last year we sold you a POWERTRUCK. We feel that to you as well as to every other owner of one of these efficient machines we owe a debt of gratitude since it is mainly through your recommendation that we have been enabled to make sales that have totalled nearly 400 vehicles in 12 months.

It is true that we have employed a competent sales force and have worked hard. We have not been sparing of our service. All of these things have helped, but we could never have accomplished such great results without your co-operation.

We have now outlined a plan whereby you may become a profit sharer in the sale of these trucks. This doesn't require any work on your part. All we ask is that you send us the name and address of any person who is in the market for the truck. We'll do the rest and if we are successful in making a sale, you will be entitled to call around at our salesroom and select any one of the following gratuities as your share in the transaction.

Six Months' Free Inspection.
1 Inner Tube.
Set of Wrenches.
1 Hind View Mirror.

Set of Spark Plugs.
Tail Light.
Set of Chains.
Tire Lock.

Sincerely Yours,
J. C. SMITH, Powertruck Co.

Specimen Letter That Can Be Used by Dealer to Increase Truck Sales. The List of Prizes May Be Made Out in Any Way Desired. Even Though They Amount to Greater Value Than Those Specified in the Letter They Will Be an Inexpensive Way of Getting Trade.

er—"but I won't have it long if business continues to get no better as fast as it has done for the last three weeks. These salesmen of mine, with the exception of about two of them, ought to bleach their hair to match what it covers," he continued. "They seemed to sell all right enough up to a little while ago. Now business is on the hummer, or else they're laying down—I don't know which," he concluded, dropping his smoking cigar into the cuspidor with a stealthy motion.

"Business is good," declared the salesman with a tone of finality, noting the demise of the cigar and tendering another in its place—"just as good as these cigars only you have to get used to both of them."

"What kind of talk is that?" asked the dealer, waving away the proffered cigar—"even if you admit that business is 100 per cent. better than that weed I just threw away, you admit that it is rotten—what do you mean?"

The salesman laughed. "I mean simply this. The cigar is a good one if you get used to the brand. The trouble lies with you. You've been used to smoking a Colorado Clarence. You can't see any other kind. By the same token you've been used to doing business in a certain way during the war. Now conditions have changed. You're still trying to work by the old methods. You need a change—that's all," he explained. "Business is good if you go after it right."

and get them coming," opined the salesman.

"That's the trouble—how am I going to start them coming?" queried the other.

"That's what I wanted you to ask me," grinned the salesman. "Now that you have, I'll tell you exactly how it can be done and you've got to listen."

"Shoot," invited the dealer, settling himself more comfortably in his chair.

The salesman was silent for a moment. Finally he asked, "Where do your salesmen go to find business?"

"Why—er—I don't really know as I can tell you," answered the dealer. "Most anywhere I guess. Why?"

"There's the main source of your trouble—right there; you don't know whether they try to find it in the front row of the moving picture house or where—" challenged the salesman. "Why don't you know?"

"Why don't I know?" repeated the dealer. "Lord sakes—what do I care where they find the business. It's up to them—all I want is to get the order."

"That's all right," persisted the salesman. "The order is the main issue. You've got to get it—but in these parlous times the fact of where your salesmen go to get it and how they work to land it is a mighty important fact. It's the cause that gets the effect so to speak. Am I right?" he queried.

"Well—yes—I suppose so," acknowledged the dealer. "Never thought much

Columbian Oil Tanks for Motor Trucks

Especially Constructed to Distribute Liquids Economically to Withstand Hard Service and Surging of Load—Fitted with Special Mounting, Welded Partitions and Heads.

DESIGNING and construction of truck tanks for the transportation of fluids, such as gasoline, kerosene, lubricating oils, vegetable oils, turpentine, etc., has undoubtedly presented the most difficult of all body-building problems. A fluid load is more susceptible to motion than any other, as it is constantly surging whenever the truck is travelling. The difficulty presented to tank builders was that a liquid is not cohesive and will not stick together as sand, grain, coal, etc. This latter material will stay heaped without much but a base to retain it, but liquid cannot be heaped; it must be contained within four walls.

The original tank manufacturers were confronted with this problem, to contain the liquid safely in transit. They met the problem with rivetted wagon tanks, cylindrical in shape, but were of such weight as to leave too little of the rated capacity of the truck for fluid live tonnage.

The next step in tank construction was substituting the oval tank for the cylindrical type, which gave a lower specific gravity and a minimum opportunity for surging. The continued use of the rivetted tank prevented the reduction in weight, because steel lighter than boiler plate cannot be rivetted securely enough to withstand strains and stresses of travel over the highways in addition to the pounding of the load in the tank. The use of boiler plate means the carrying of dead weight and as dead weight is absolutely the reverse of pay tonnage the next problem was to eliminate it and thus increase the pay load transported.

Autogenous Process of Welding Solved Problem.

The autogenous process of welding is stated to have solved the problem of reducing truck tank weights and it made possible the use of lighter metal, as it was discovered that this welded together formed a monometallic unit, stronger and more durable than the original rivetted type of tanks. Manufacturers are today using both the arc and the autogenous process in welding tanks. It is stated that at the present time practically all or within a fraction of a 100 per cent. of all tanks in use are of welded construction.

The Columbian Steel Tank Co., 1519-1625 West 12th street, Kansas City, Mo., foresaw the possibilities for greater development and the engineering department continued to study the problem from every conceivable angle, experimenting with new designs until they produced what is proving to be, in their estimation, the latest and best designed fluid tank.

Mounting of the Tanks.

After the oval and semi-rectangular tank had proven better than the cylindrical type and after welded tanks made of light steel had replaced the heavier rivetted types, with a consequent saving of millions of dollars to the distributors of refinery products, attention was next directed to the problem of mounting the tanks securely and advantageously on the motor truck chassis.

The engineers were far from satisfied with the method in vogue, of strapping the tank to the wood cross cradles, the cradles to the longitudinal sills and the sills in turn to the truck chassis frame. They were not in favor of the channel iron cradles and sills cushioned with wood inserts. They concluded that their efforts would be wasted on any type of a

cradles and band irons. To the lay man this seemed a radical step, but by using a patented process of inserting the heads and partitions it is possible to extend them below the bottom of the tank and for extensions or supports much stronger than the heaviest silling and cradles it is possible to use.

In eliminating the silling much more was accomplished than the securing of a stronger support. The dead weight of the assembly was reduced from 200 to 2000 pounds. In short, 200 pounds dead weight was eliminated on the smaller jogs and 2000 pounds on the largest truck tanks ever built. This means a consequent saving of horsepower, fuel and wear and tear. The height of the tank mounting was decreased considerably, thus reducing the center of gravity. The



Columbian Welded Tanks Are Known and Used by Large Oil Distributors in All Parts of the Country.

mounting which was not a monometallic unit with the chassis and tank. When cradles and sills were used under the tank it is claimed that there was always a tendency for the tank to become dented and worn by constant friction at the bearing points. Grit and oil accumulated, producing a grinding compound between the tank and cradles. Denting was overcome by mortising timbers in the cradles and running them the full length of the tank. This, however, increased the dead weight, a point that it was desired to eliminate as much as possible.

The tighter the band irons were drawn up, after the wood had shrunk, the greater became the strain.

Reinforcing Offers Solution.

The heads and partitions are the reinforcing factors which give a tank its strength to withstand strenuous usage. Experiments by the company engineers demonstrated that these could be used to serve a further valuable purpose—to support the tank on the truck frame without the use of intermediary sills,

principal cause of crystallization was also reduced, that is, friction between the tank body, silling, cradles and band irons.

Pipe Lines Made a Monometallic Unit.

The company improved not only the tank mounting, partitions, heads and supports, but its pipe lines also were redesigned into a monometallic unit. The partition mounting made it possible to prevent vibration of pipe lines and to free them of wrenching strains, the cause, in the old-style mounting, of considerable trouble through the breaking of flanges, couplings, threads and hangers. Instead of flanges, funnels were welded to the tank bottom. This method of fastening provides a quicker flow from the tank compartments to the pipe lines. To eliminate couplings the pipes were welded to the funnels and, by providing a very gradual curve to carry the pipe lines through the extended partition supports at the desired points, firmly securing them by welding to each partition extension through which they pass. The

absence of sharp right-angle turns and threaded connections in the jointless pipe lines reduces friction to a minimum and secures a rapid flow of the fluid and greater capacity. The 1½-ton pipe line approximates the flow of a two-inch line assembled with flanges and nipples.

The advantages from the low mounting of the load are easily apparent to any one familiar with haulage problems. It is an indisputable fact that the lower a load is mounted on the chassis the lighter the draft, the less side thrust and consequently easier propulsion of the vehicle. With a surging, fluid load, low mounting advantages are doubly advantageous as compared with other loads. With the partition mounting used in the Columbian tank only 4½ inches are required between the bottom of the tank and the top of the truck frame.

Reduction of Body Weight Follows.

Even of greater importance is the reduction of body weight which follows this type of construction and mounting, a factor that should always be kept in mind by the user as well as the builder of truck tanks. Dead load costs money and pays no profit, and should be eliminated wherever possible. An instance is cited to show how this item works out in practise. A certain truck owner, who makes a specialty of delivering oil on contract, purchased a 1000-gallon partition mounted tank to replace a heavy type tank. The difference in weight between the two tanks was equivalent to 3 9/10 barrels of oil.

This contractor keeps an accurate account system of costs. He reports that it costs him eight cents a barrel to haul it. His truck made 2028 trips in a year,

which means that \$632 was lost by hauling the excess dead weight in the old tank. This dead weight was turned into pay load in the new tank, making a net profit on the haulage solely of the increased capacity, amounting to \$556.81. To summarize: 3 9/10 barrels more of oil were carried in the partition mounted tank than in the other without adding a pound of weight to the truck. The profit earned in a year's time on the increased load capacity alone figures \$1189.54 gross, or \$556.81 net. In other words, a loss of \$632 was converted into a profit of \$556.81 by simply changing tanks.

To bring out the actual saving more forcibly, the company states, "that it is extremely conservative to estimate the cartage cost on a gallon of gasoline at one cent. It is also extremely conservative to calculate that on all sizes of partition mounted tanks, an average dead weight is eliminated over the old-style mounting equivalent to the weight of 75 gallons of liquid in each tank. This extra capacity, with no increase in the weight of the equipment, at one cent, turns the old time dead weight into a saving of 75 cents each trip. Five trips a day is \$3.75 a day saved. As there are 200 working days in the year this would figure \$1125 yearly saving on a single average truck tank. For the firm with a fleet of 1000 partition mounted tank trucks this type of mounting will effect a yearly saving of \$1,125,000. From these figures it is easy to see the enormous saving when dead weight is eliminated, and what it means to distributors of oil when the great number of truck tanks in service is considered.

Many other styles of storage tanks and

delivery supplies are manufactured by the Columbian Steel Tank Co., which include heavy steel circular tanks for the storage of large quantities of fluid, curb and shop dispensing outfits, welded carrying cans and funnels, shipping drums, refinery equipment, underground storage tanks and many other items used in the oil and liquid fuel industry.

BODY DESIGNED FOR FISHING TRIPS.

While the Knightstown Buggy Co., Knightstown, Ind., specializes on the manufacture of funeral cars, it does not confine its production to this one line by any means. For example, there is shown, herewith, a body arrangement that may be attached to a three-quarter or 1½-ton chassis, and makes a special appeal to fishermen or other sportsmen.

This type of special body may be used for other general touring and camping purposes if the owner wishes, as the fittings provide for carrying several passengers in addition to cooking and sleeping quarters. A single bucket seat is provided for the driver, a rear door with steps and two front side doors, each fitted with roll-up curtains and plate glass panels arranged in such a manner that the glass drops into pockets in the doors.

The rear of the body is provided with a small space for kitchenette, stove, ice box, locker, etc. Double cushions are fitted to the seats, running lengthwise of the body, which, in the day time, are used as backs for the seats and at night are raised and fitted to overhead supports, forming additional sleeping quarters for members of the party.

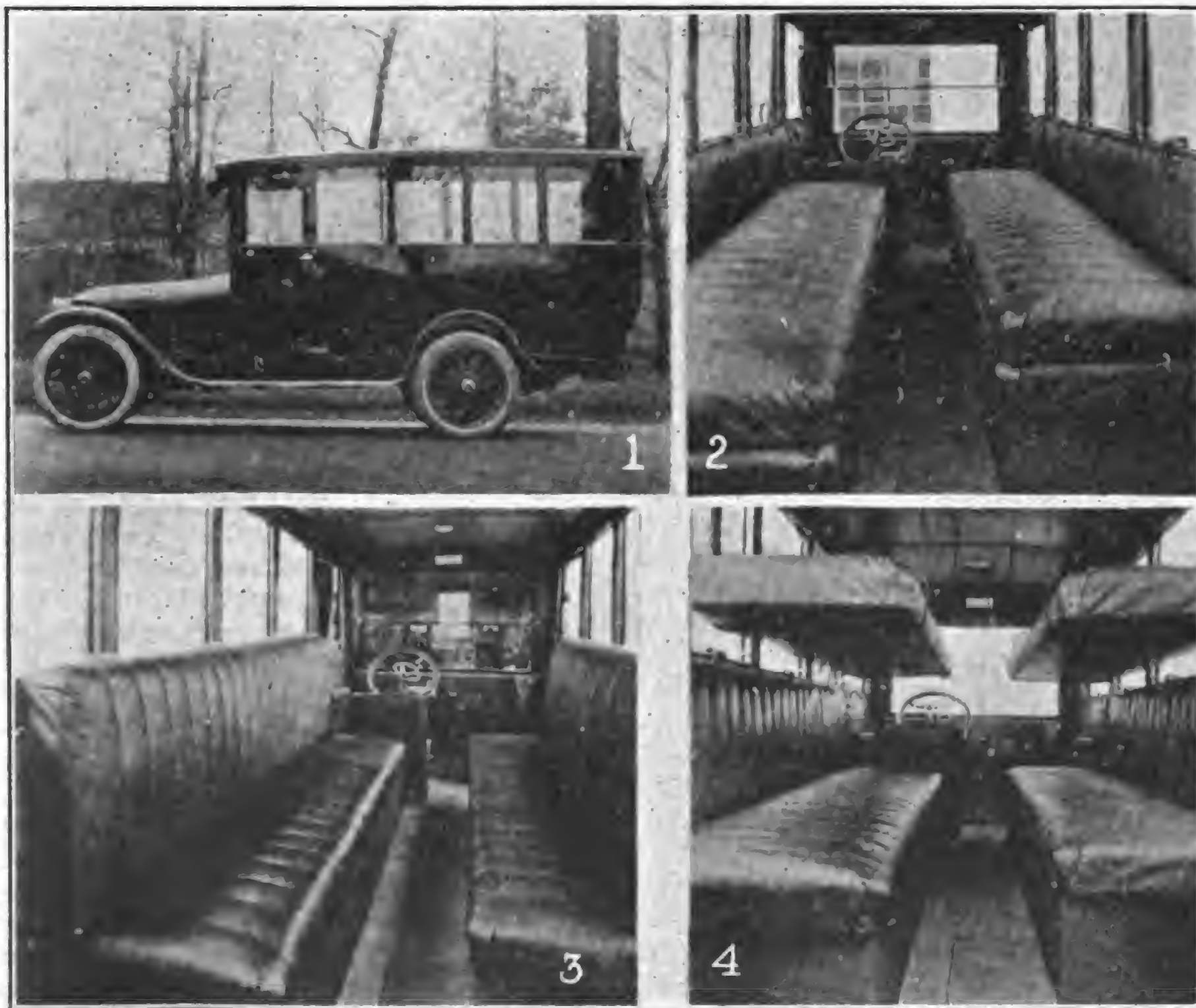
NEED OF MORE TRUCKS INDICATED BY FARM SURVEY.

Farm Survey Reports, issued in the form of motor truck bulletins by the National Automobile Chamber of Commerce, show that the number of farms in the state of Rhode Island is 3500 and the number of trucks on farms is given as 1350. In answer to questionnaires in regard to the need for more trucks, Providence county returned a majority in the affirmative, while Newport county's answer was "No."

In Maryland the number of farmers who use motor trucks was stated as 2817. Eleven counties preferred one-ton trucks, four 1½-tonners, three two-tonners, one each one to three-tonners, 1½ to two-tonners and ¾ tonners.

The figures for Pennsylvania were as follows:

Number of farms, 186,863; number of trucks on farms, 12,631; 43 counties replied "yes" to the question of the need for more trucks, 10 "no," and two didn't reply on this point. Fourteen counties announced a preference for one-tonners, 11 for one to two-tonners, seven for one to 1½-tonners, five for two-tonners, three each for 1½ and ¾ to 1½-tonners, two each for ½ to one-tonners, ½ to 1½-tonners, and 1½ to two-tonners, and one each for ¾ to one-tonners, ½ to ¾-tonners, 1½ to 2½-tonners, ¾ to two-tonners and ¾ to 1½-tonners.



Fishing De Luxe with the Knightstown Company's Special Body Equipment—No. 1 Shows Complete Job from Outside; No. 2, Interior View with Two Extra Spring Cushions in Place on Each Side; No. 3 Shows Two Extra Cushions, Forming Backs for the Seats for Day Service; No. 4 Shows Two Extra Cushions in Position for Sleeping Berths.

POWER HAULER WINS PRAISE OF PETROLEUM PRODUCERS

Pioneer in Oil Development—Opens Virgin Territory
Heretofore Thought Unavailable—Now Considered a
Most Essential Factor in Operation of Oil Fields.

(This story is a compilation of statistics furnished by F. W. Fenn, Secretary, National Motor Truck Committee, National Automobile Chamber of Commerce. Mr. Fenn is a recognized authority on motor transportation.)

IF THERE is one factor that more than any other has contributed actual service to the production of petroleum it is the motor truck. It is in this field that the commercial vehicle finds the supreme test of its powers and proves its right to the high place accorded it by economists as an efficient unit of transportation. Driving steadily along over miles and miles of virgin country, through roads that are little more than paths, hub deep in blinding dust, or clinging mud of the clay bottom land, the high-powered hauler has won its way and delivered the goods through going that has caused the stoutest hearted horses to lie down in defeat.

Guided by drivers who many times had little actual knowledge of its intricacies, the iron-lunged truck has made easy going of highway conditions that precluded the use of animals and by so doing has opened up new oil districts, and released to the world a valuable supply of much needed fuel, years in advance of the time that it would have been available had the producers been obliged to await the slow construction of the railroad. It has performed its work well and has gained well-deserved praise from oil men throughout the country who unhesitatingly say that it has at all times and under all conditions done more than was asked of it.

No field of motor truck operation presents as great transportation difficulties and problems as are to be found in the production of petroleum. In the rainy spells the soil in most of the oil fields becomes very muddy. During this period, which generally lasts for three or four months each year, trucking continues steadily and, though few roads are of the improved type, delays encountered due to the inability of the trucks to get through with materials are very few, the vehicle plowing along regardless of conditions. It is apparent that if highways were properly built in the various fields they would pay for themselves in less than a year, but up to the present time very little attention has been paid to the possibilities in this development.

For the entire distance between Lusk and the Lance Creek fields in Wyoming there are practically no level stretches. Many of the grades are four and five per cent. At many of these most difficult points along the road branch trails have had to be run around the mountain to

prevent trucks from becoming damaged during inclement weather. Fortunately, much of the native soil in this territory is sufficiently shaly to prevent the very extensive development of washouts.

In other fields roads become pulverized on the surface to such an extent that traction is usually obtained in dust from one to six inches deep. Where this condition prevails the pot holes and ruts in the roads become concealed, infrequently causing axle, frame and spring trouble.

Under these working conditions,

even 60 feet in length, has been made possible on these pipe trailers.

In special cases it is found most feasible to use four-wheel trailers, which have all the advantages of the two-wheel pipe trailers. This enables the operators to adjust the distance between bolsters and to press into service any type of truck without the necessity of removing the body when the trailer is to be drawn.

An oil company was confronted at one time in its frontier operation work in Wyoming with the problem of hauling two 15-ton stills from Casper to Salt



Oil Wells in the Bakersfield District, Cal.—This Mammoth Field, One of the Largest in the Country, Owes Much to Motor Trucks.

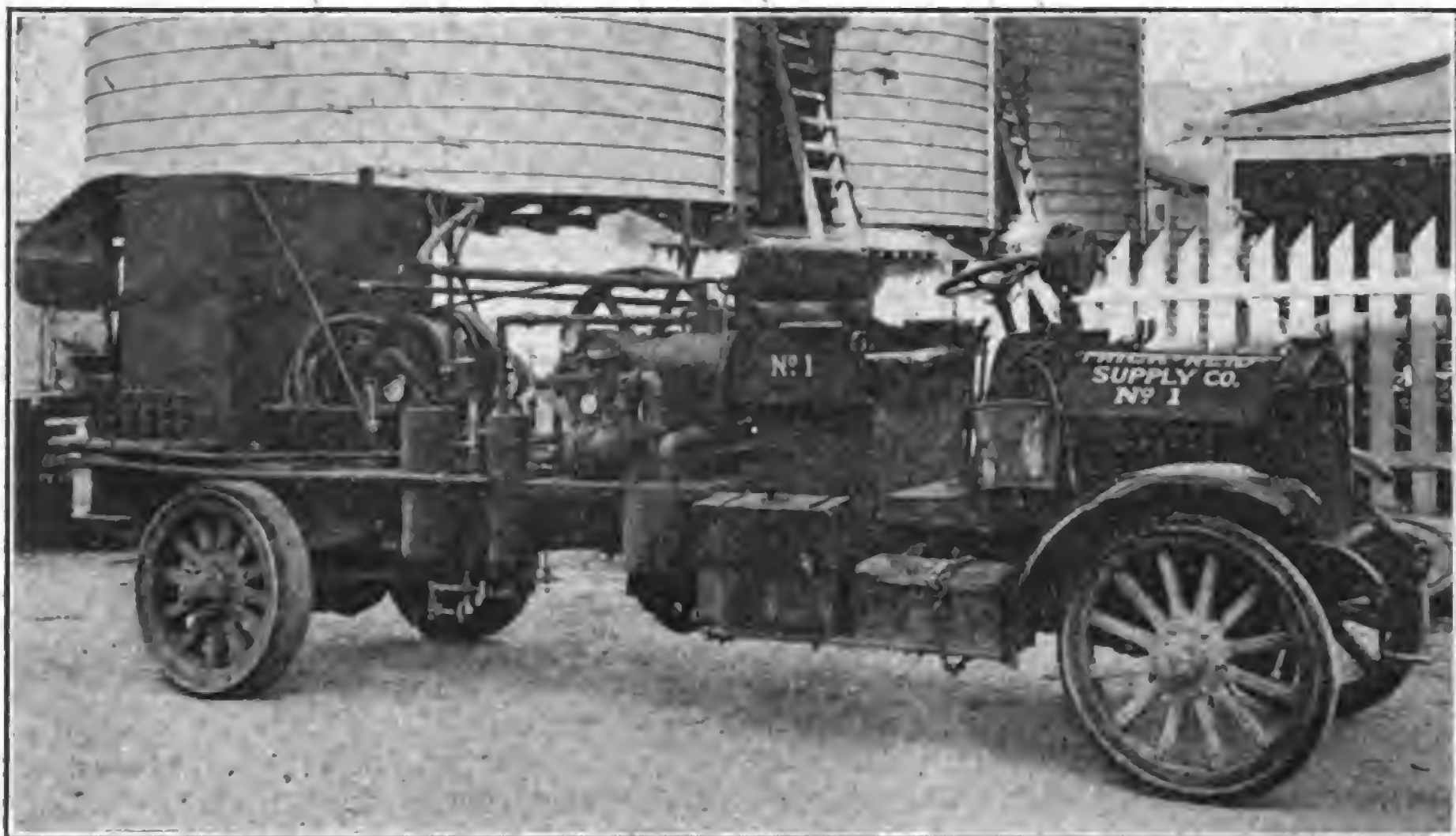
wretched to the extreme in many cases, the life of the truck is no more than two or three seasons, although satisfactory service for any length of time can only be secured by the exercise of the utmost care in the selection of equipment.

Body Equipment an Important Item.

Approximately 75 per cent. of the hauling in the Texas and Oklahoma oil fields is carried on by means of specially designed truck and trailer combinations. Six-wheel units of this type permit the proper distribution of the load. Pipe and timbers, two of the principal materials delivered to the oil fields, usually run from 16 to 20 feet in length. By the use of extension reaches, which are adjustable to the length of material to be carried, the transportation of poles that are

Creek, a distance of 50 miles, much of which had not been broken over by trails. It took 36 horses and 10 men 30 days to transport the first still. In view of this delay the company decided to employ motorized service on the second delivery. Around the second still there was erected a timber cradle, the front end of which was supported on a swivel bolster mounted on a pair of $\frac{3}{4}$ -ton two-wheel trailers coupled together. In order to meet the grade conditions encountered en route another truck of two-ton capacity was used to add power on the grades. In this way the running time was cut down 750 hours.

Many operators are accustomed to run their loads, especially casing and timbers, up past the cab to prevent undue weight on the rear. When this method



This Truck, Equipped with Gas Testing Apparatus, Goes Direct to the Different Wells and Tests the Crude Petroleum for Gas Content.

of loading is permitted improper load distribution on the front and rear axles will naturally occur. Out of this practise has developed the need of a specially designed body to permit pipe and other lengthy material to extend from four to five feet beyond the width of the cab. Narrow cabs of this type have the advantage of allowing the load to be carried nearer the center of the chassis than would be the case with many of the standard cabs, insuring fewer load strains on the chassis over uneven roads. The windshield, which is divided on a horizontal line a little above the center with the upper sash hinged, is supported in such a way as to be unaffected by vibration. Another point, perhaps equally as important, is that these cabs are interchangeable with the present standard cabs.

Conditions of Roads Governs Class of Tires.

At the present time many of the operators have an expressed preference for pneumatic tires. Greater road clearance, less weight and higher speed are the requirements that have brought about this demand. These tires serve further to nullify the effect of an open governor and to make possible better traction in bad weather. Where the soil is grass-covered and muddy, easier operation is pos-

sible, but in stony country the casing is apt to become easily punctured and torn. In general, if pneumatic tires are used the demand is for slower gear ratio; the present standard gear ratio seems satisfactory for solid tires.

In Wyoming pneumatic tires are not so popular. The action of the deep ruts is so severe on the side walls of these tires that extra speed qualities are largely prohibitive. In the last analysis the operator must be governed in his choice by the conditions of the roads in his territory during both the wet and dry seasons.

Oil Well Pullers Mounted on Truck Chassis.

From the standpoint of practical utility the development of the oil well pullers mounted on truck chassis cannot be overlooked by the operator. It is an acknowledged fact that the constant pumping of an oil well causes sand to be drawn in between the well and the pump casing. Unless the sand is periodically removed production which decreases in proportion as the sand increases, may temporarily cease.

The best method to follow is to pull out the pump tubing and bail out the well. This can be accomplished very efficiently by an oil well puller mounted on the truck chassis. The cable winding

drum of the winch is mounted on a four-inch shaft, which is supported at its ends by a firmly built frame. The forward speed (winding) of the winch drum may be controlled by both the truck transmission gearing and throttle. Reverse speed (unwinding) is accomplished by releasing the winch drum band clutch to permit the weight on the cable to pull out the line. The total weight of the complete equipment, including chassis, will average approximately 13,500 pounds.

Truck Abuse from Overloading Serious.

In the rush of business during the open or good seasons, which range from six to nine months of the year in the oil fields east of the Rocky mountains, trucks in general are called upon to make up in earning capacity for the intervals of enforced idleness. This calls for continuous, rapid transportation of pumps, rods, casing, lumber, special machinery and other materials which are requisite to successful and efficient drilling for every producer, regardless of how extensive his operations are, is fully cognizant of the fact that one of his biggest problems is to maintain sufficient equipment on his property to permit uninterrupted drilling of his new wells. Oil field trucks on this account rarely are operated except under the most extreme hauling conditions.

Under the circumstances there is a tendency to overload. All of the accepted laws of transportation are seemingly ignored. Cases are on record where trucks have been discarded upon the completion of overload haulage work during a working period of less than four months. For, it must not be forgotten, that every hour wasted on account of the lack of pipe casing for the drilling machinery means a corresponding waste in dollars and cents. The loss of a day has been known to represent the sacrifice of thousands of barrels of crude oil, if a competitor who has an option on adjoining property strikes the same pool and begins to pump first.

It is not very uncommon therefore to witness a huge still or a load of 10 to 15 tons of casing turned over in the bottomless mud, with the trailer chained to the load. Accidents of this nature result invariably from the terrific strains that are imposed on the axles, frames and springs from the evil of overloading.



The Pictures Show a Good Example of the Way in Which Motor Trucks Are Used to Haul the Pump Tubing Out of the Ground When Constant Pumping Clogs the Pipes and Lowers Production. This Outfit Consists of an Oil Well Puller Mounted on Regulation Chassis.

A truck will ordinarily stand some overload. The manufacturer refers to this as a factor of safety; it is his idea that this additional strength will take care of the maximum strains which may be encountered. This should be regarded by the operator as reserve capacity and should not mean that the truck will carry a 50 or 100 per cent. overload without damage to the machine. Truck abuse resulting from overloading is a serious matter as it blocks the progress of transportation, which is the very life blood of the petroleum industry.

Many producers are convinced that no scientific method of operation can be developed that will eliminate this and other kindred practises. They insist that conditions make it impossible, at least impractical to give their trucks the same attention that owners do who operate them under more favorable circumstances. This premise is in part truth and in part error.

No Truck for Every Road—School the Driver.

Operating costs can be reduced measurably through proper driving and routing. Service over a number of years is almost entirely dependent on the driver: he is the crux of the problem. In the oil field the ever-changing surface of the roads prevent the development of specially designed trucks to take care of conditions of stress and strain, which are obviously not confined within any definite limits. The average driver is fully cognizant of this fundamental premise: he perhaps is not aware, however, that doubling the speed of the truck increases the violence of road shocks by four. It is well, therefore, to instill a feeling of responsibility in the truck driver. The whole question rests finally with the size of the fleet that the operator plans to use. If it consists of 10 or more trucks it will be found more feasible to hire one or two expert mechanics than to make each driver individually responsible.

In any event the opportunity of schooling drivers should not be lost sight of. Practical demonstration sessions have done more to bring about better results than perhaps any other two factors. In addition to the routine mechanical instruction, there are many fundamental laws of truck operation that can be emphasized. A driver may not realize that



Loading Crude Petroleum from an Elevated Tank in the Oil Fields Near Tulsa, Okla. This Petroleum Is to Be Tested for Gasoline Content.

he is damaging his truck in the selection of one road in preference to another, but it stands to reason that even 30 or 40 miles over fairly smooth roads is much more economical than to go 10 over bad trails. In the oil fields proper and in many other places en route the driver will find that he has the choice of much desirable territory over which to pilot his cargo.

Larger Development of Motorized Service Yet to Come.

Producers who will therefore give some time and attention to the study of these fundamentals in truck operation in the oil fields will obtain better and more permanent efficiency. The tendency has been to get the load to the derrick in the shortest possible time; the great need for supervision of the motorized equipment has been overlooked. The oil producer certainly is entitled to the length of service of the average truck, the depreciation of which is figured on a basis of 100,000 miles as its minimum life. Scientific operation and maintenance will go a long way to make this record possible in oil fields, increasing the possible length of service from 100 to 200 per cent.

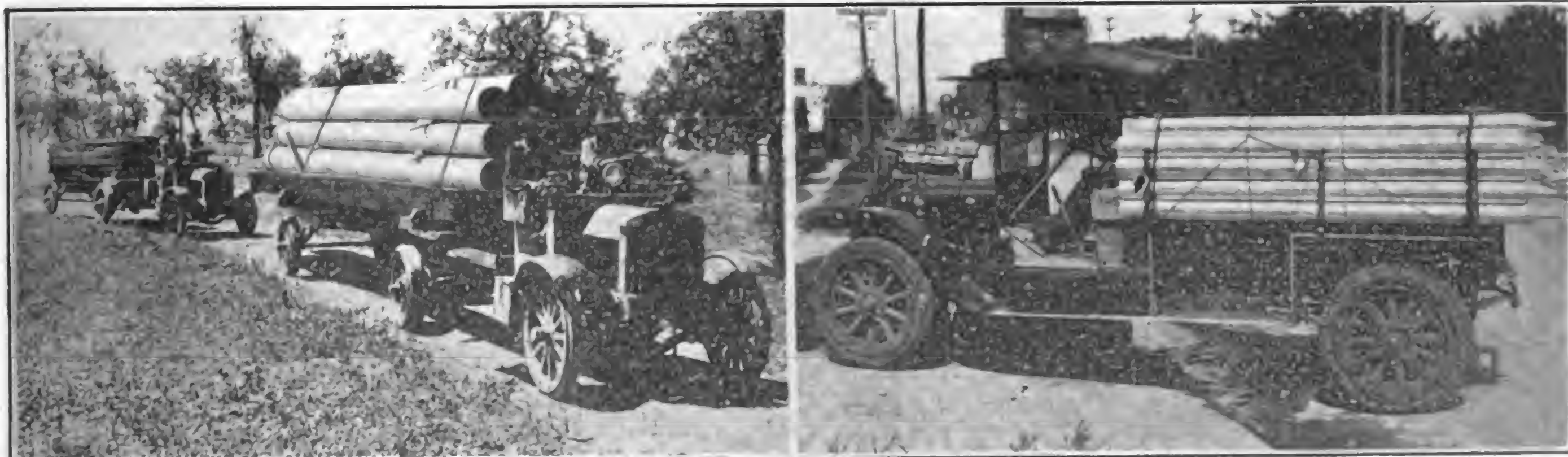
The motor truck has come to be a very

important part of the operator's equipment in the production of petroleum. The impressive sizes to which the truck fleets of some of the largest oil companies in the work have grown during the past few years is a striking confirmation of this assumption.

Although the existence of petroleum was known as far back as the dawn of history, it was not until 1859 that its possibilities as a valuable product were determined, and the first oil well successfully sunk near Titusville, Pa.

From that time until the present day the production of petroleum has steadily increased, new fields being discovered in almost every state of the Union west of the Allegheny mountains and in almost every country of the world, grading in color and weight from pale yellow to jet black and from as light as gasoline to as heavy as tar.

With the growing expansion in the utilization of petroleum, as witnessed in the development of gas oil for the manufacture of gas, and the increasing demand for fuel oil, there is certain to come a larger development of motorized service in the petroleum fields. All of which is striking testimony to the efficiency of the motor truck.



Note the "Roads" Over Which These Heavily Loaded Trucks Are Running. Trailers Are in Great Demand in the Oil Country Where Every Moment Counts.

This "Oil Well Shooter," Is Loaded with Enough Nitro-Glycerine to Blow a Battleship to Pieces. Body Is Hung on Special Springs for This Work.

TOURIST TYPE TRUCK SHOWS FINE ECONOMY

THE Stoughton Wagon Co., Stoughton, Wis., describes and shows a special tourist truck and body which was recently constructed for one of its salesmen, H. G. Dustman, with which he travels through the South, at the same time providing living quarters for himself and wife.

The truck is a one-half ton model, having a tourist body mounted on the chassis. The coach body is equipped with a full sized bed, which can be folded into a davenport during the day, as well as an oil stove, folding table, clothes press space under the bed, toilet cabinets built in the side of the body, reserve water tank and gasoline tank. The windows are of bevel plate glass, fitted with copper screens and the inside of the body is finished in mahogany.

Mr. Dustman reports to his company that the mileage which the truck had travelled at the time of the report was 5190. Some of this was over roads almost impassable and some of it was over very fine roads.

After running over all kinds of roads from Stoughton, Wis., to Miami, Fla., through the Carolinas and part of Alabama the tires show but little wear. Some idea of their condition can be gained by examining the illustration.

Mr. Dustman states that no repairs have been made on the truck and it had not been touched by a wrench. The engine runs as quietly as when it left the factory.

The body is in fine condition, considering some of the roads that it has been necessary to travel over. It has of course, become slightly scratched as it has been over a few rough trails.

The engine, he reports, has never had a minute's time spent on it except to change the oil in the crank case twice. The rear axle has only been touched once and this was for a change of oil in the differential housing. It has not been necessary to adjust the brakes, but he is using about a quarter of a pint of oil in each brake every two or three days.

Amount of Gasoline Used in Travelling 5190 Miles.

To date the engine has consumed 331 gallons of gasoline, some of this being



Interior View of Tourist Type Truck, Showing Home-Like Appearance.

used to wash the engine. Some has also been drawn out for other cars on the road and some consumed in pulling in other cars along the road.

The amount of oil used is given as 43 quarts. This includes all oil purchased to date and about two gallons now carried extra in the car. The secret of small oil consumption as given by Mr. Dustman is that he uses about two quarts to every gallon of gasoline in the fuel tank.

Electric Equipment Reported in Fine Condition.

The electric equipment is stated as being in fine condition. The storage battery has been filled with water three times and the generator keeps the battery fully charged at all times. Electric lights are used, both inside and out of the car, whenever desired and at no time has it been necessary to seek any other means of lighting.

Mr. Dustman ends his report by saying that this mode of travelling is so far in advance of the trains and hotels that there is no way to compare it. As near as he can figure the cost to travel by car is less than one-fourth that on trains. Then when he arrives at a prospect he has something to show.

STORAGE BATTERY PROFITS \$6,157,091.

The consolidated statement of earnings of the Electric Storage Battery Co. and its subsidiary, the Willard Storage Battery Co., for the year ended Dec. 31, 1920, shows net profits for the two companies, before federal taxes but after inventory adjustment, of \$6,157,091. After deducting federal taxes, estimated at \$1,500,000, the surplus was equal to \$23.31 a share on the \$19,979,325 capital stock. The surplus for the year, after dividends, amounted to \$4,125,885, bringing the profit and loss surplus as of Dec. 31, 1920, to \$17,466,192.

FINANCIAL STATEMENT OF FRANKLIN CO.

The financial statement of the H. H. Franklin Manufacturing Co., Buffalo, N. Y., as of June 30 showed that the company has paid all its bank loans. The current assets approximate \$7,800,000 and current liabilities are about \$2,400,000, making a net working capital of \$5,400,000. As of Aug. 31, 1920, when inventories were at their peak, the company's bank loans aggregated \$4,785,000. Production is at rate of 43 cars a day, compared with 40 from Feb. 10 to June 24 last.

SALES OF PACKARD CO.

The net sales of the Packard Motor Co., Detroit, Mich., in 1920 were \$58,894,525, against \$55,180,656 in 1919, and net after depreciation \$9,415,957 against \$11,506,739. The net after depreciation, federal taxes and interest charges totalled \$6,276,863, against \$5,433,634 in 1919. The balance sheet of Feb. 28 last shows current assets of \$36,354,086 and current liabilities of \$13,464,072. Of those current assets, \$5,944,326 was cash.

Rhode Island has 16 motor vehicles for every mile of road.



Stoughton Tourist Type Truck Equipped for Long-Distance Touring.

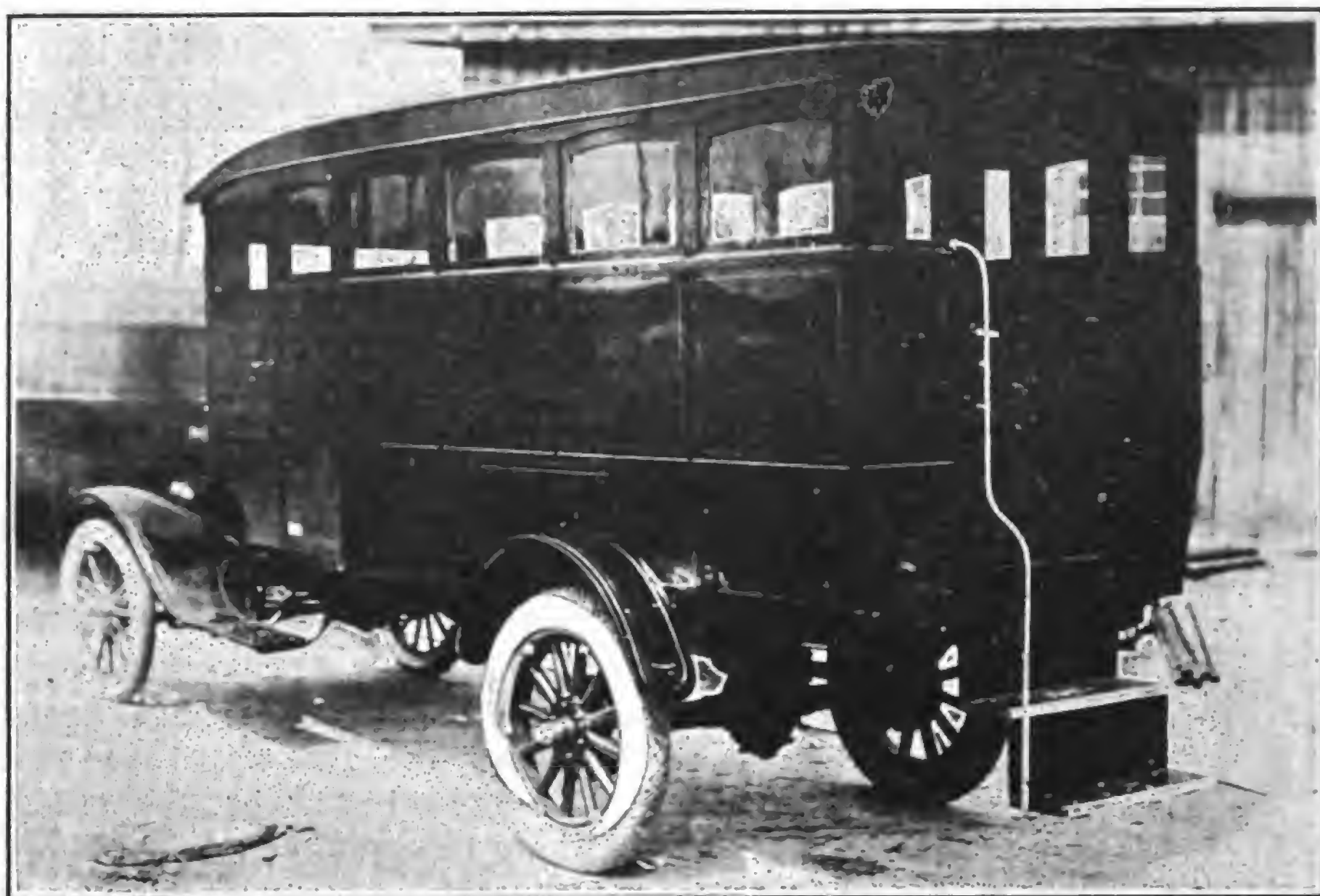
SCHOOL AND BUS BODIES OF SPECIAL DESIGN

THE McKay Carriage Co., Grove City, Pa., manufactures a complete line of commercial vehicle bodies for school and bus service. With the coming of good roads, bus transportation has been growing rapidly, especially throughout the country districts. The advantages to be gained by sending children to centrally located schools, doing away with small country schools, offers better opportunities to acquire knowledge and at the same time affords them the same privileges as are enjoyed by their city cousins.

The use of the school bus has now become a fixture and the increasing demand for this type of body is featured strongly when a company confines its production to a line which caters mostly to this class of trade and gives purchasers the latest ideas in body construction for this type of commercial service. Bus bodies may also be adapted to many other lines of service, one of which is the transporting of mill or shop help where other means of conveyance are not at hand. Jitney service in large cities also finds use for bodies of this type which have a carrying capacity considerably greater than that of the regular touring car. Thus the field of the bus body is quite large and the McKay Carriage Co. in specializing in this type offers to the trade at large the very latest and best ideas that have been developed in this line of body construction.

Several models are built, of the enclosed type, fitted with either side or cross seats, equipped with upholstered backs and windows that may be dropped during warm weather. These bodies are provided with wheel boxes which increases the width, providing ample seating room inside and they may be furnished with rear or side doors, according to the seating arrangement. Electric lights are fitted for night driving, while every convenience is incorporated which will tend to the comfort of the passengers.

Entrance and exit to the side-seat and half cross-seat bodies is by means of a single door beside the driver at the front



Continental School Bus Designed for Ford One-Ton Truck Chassis.

and an emergency door at the rear. In the side door, cross-seat type of body, having full length cross seats, doors are provided at the side for each cross seat.

The passenger capacity of the bodies ranges from 10 in the smaller to 50 in the larger bodies designed for heavier truck chassis.

All bodies are constructed of the best of material and are well braced and ironed to withstand the strains imposed upon them by traffic over rough roads and the usual wear and tear of travel.

Automatic door openers are provided on the half-cross and side seat models, which allow the driver to open and close the single front door without leaving his seat.

COMMERCIAL AND BUS BODIES FOR FORD TON TRUCK CHASSIS.

The Continental Car Co. of America, Inc., Louisville, Ky., manufactures many different styles of commercial bodies for the Ford 1½-ton truck chassis, which of-

fers intending purchasers a wide variety of styles from which to choose.

These bodies are built for every purpose from the ordinary express type adapted to model T chassis to the type which is mounted on the Ford one-ton truck chassis and is adapted for the use of farmers and school bus service.

All sills and bolsters used in the construction of Continental commercial bodies are made of thoroughly seasoned selected hard wood. The side panels are rigidly braced by means of heavy iron forgings. The flare boards are protected by steel strips, while the drop-end tail gates are extra heavy and well ironed with three steel forged hinges and furnished with chains.

The side panels of the express bodies are of thoroughly seasoned selected wood, well ironed. The panelled bodies are constructed of either metal or Vehisote, which is a water and weather-proof material, claimed to be superior to wood. The tops are supported by slats and ribs of first-quality lumber and are covered with a high grade of canvas duck. Bolts instead of screws are used in fastening the body parts together, which insures a particularly rugged construction.

Bus bodies for mounting on the Ford one-ton chassis for school transportation service are made especially for this purpose, are unusually well constructed along the lines of other bodies manufactured by this company and fitted with every convenience for the safe carrying of children to and from school in the rural districts. Seats are provided along the sides of the body, fitted with spring cushion upholstery, which provides ample comfort for the school children, while a step and door are fitted at the rear of the bus by which the children enter and leave the body without danger of falling. Glass windows along the sides provide sufficient light for the interior and for heating in winter exhaust heat from the engine may be utilized.



McKay School Bus Body Mounted on Oldsmobile Three-Quarter Ton Chassis.

EDITORIALS

“ONCE there was a man”—this is one of those parable stories—whose name was Price Cutter. This man had long desired to build himself a big, substantial residence—one that would be a credit to himself and to the entire community in which he dwelt. He had plenty of money with which to tackle the job and there wasn't the slightest reason in the world why his dream shouldn't eventually come true—except one.

He first started in to dig a cellar. He went at this part of the work with great enthusiasm and kept up a good pace for a while. Then he encountered a sub-strata of rocks. Not great, big rocks—just ordinary ones that a real man could easily have disposed of. But Cutter was impatient to get his house built, and after plugging away at the rocks for a day or two decided that the best thing he could do would be to make his cellar a lot shallower than he had at first intended, and build his foundation high enough to make up for the loss in head room occasioned by the restricted depth of the cellar.

Well, he started in to work on the foundation, and finally got it up to where it was breast high. Then he got tired again. It was a pretty hard job to lift those heavy rocks clear up into the air, and he decided, with more or less grumbling, that he would level off his foundation where they stood. This he did, making a bad job as usual, and one that called forth the laughter of all who saw it.

He then started to build his house. It was too much work to use heavy timbers, so he framed it with the lightest he could get, and eventually got the building along to where it was ready to be boarded in.

True, it had no partitions, and no roof. Neither were there any windows. These things called for too much work. 'Twas the same way with shingling. It was too much of a job to lay one shingle at a time, so he left the bare boards as they were and let it go at that.

At this stage of the game the man began to have vague, haunting suspicions that he had not builded as substantially as he had planned. “Still, it'll have to do,” he muttered as he stood looking at the crazy structure. “At least it looks something like a house.”

“Who says it does?” said a deep voice at his elbow.

Price Cutter turned to view a large, sinewy man with an over-developed club swinging easily in his right hand. “Why, I say it does,” he muttered, disquietly.

The new comer laughed. “It looks like a band box, if you ask me,” he said grasping the club with firmer hands. “Where's the roof?” he asked suddenly.

“Why-er,” stammered Cutter. “We don't have much rain 'round here.”

“So you don't need a roof,” chuckled the other sardonically, as he fondled the cudgel. Then—“Look at that cellar—a man can't stand up straight in it.”

“Well, that's all right,” answered Cutter relievedly, “I'm a poor man and don't use my cellar much—didn't lay in much of a stock of hootch you know,” he said hopefully, eyeing the other's weapon with some misgivings. “I did a pretty fair building job, don't you think so?” he asked, fascinated by the heavy club which the tall man was slowly raising to his shoulder.

“You did worse than that,” answered the other. “You made a mess of things. That in itself is bad enough, but not to realize it is worse,” and he slowly dropped his club to the ground. “And the fact that you haven't got sense enough to know that you've made a mess of things, throws me out of a job,” he said bitterly.

“What do you mean?” asked Price Cutter excitedly. “What is your name? What kind of a job—”

"I'm the Fool Killer," answered the tall man as he moved away, trailing his heavy club. "I'm the man you've heard about for years. But you've no need to fear me," he said, sarcastically. "My contract only allows me to kill ordinary fools, and you're a long ways from ordinary. You're worse than that, so I'll be on my way," and with a bitter smile and never a backward look the tall man started off in a southerly direction. "Perhaps I'll run into a salesman who promises 40 miles to the gallon," he muttered hopefully, as he faded into the gathering darkness.

** ** ** ** ** ** ** ** ** ** **

The merchant who habitually cuts prices admits defeat. He is a piker; a joker in the deck of general industry. He thinks he is playing with a buried ace. In reality it is a deuce. His ambition may be right, but his work is ragged. Such men would more nearly reach their level if they were to get themselves a husky pack and start in the peddling game. They belong in the company of a few shoe strings and a bunch of slum jewelry. Like the man in this parable they are fools—the worst kind, because they do not realize that they are such.

VERY CRUDE INDEED.

Congress has evidently decided—somewhat tardily to be sure—that the proposed tariff on crude oil was strictly against national sentiment. To the few who were directly interested in passing the bill the multiplicity of alleged reasons given as to the benefits to accrue to general business from such an act may have sounded like sound logic, but they rang a different bell in the ears of the great American public and it is pleasant to be able to say that this impertinent tariff has been effectively disposed of through the efforts of President Harding and his colleagues.

This vicious and narrow-minded conception of good medicine for sick business would have been nothing short of demoralizing to industrial America, and to the automotive industry in particular, since its passage would have intimately influenced the future of the third largest business in this country. Its effect would have been felt in three ways. First in the operation of motor vehicles, second in the highway programme, and third, in the efficient development of farm areas.

Of course, there could have been no intention on the part of those gentlemen who sponsored the bill to curtail the supply of petroleum products. Neither had they in mind any scheme to corner the market. They were not out to enrich themselves at the expense of the public. The real purpose of the bill was to give timely aid when it was most needed—without doubt and most assuredly.

A BUILDER OF INDUSTRY.

Perhaps the heavy-duty truck does destroy a few miles of poorly constructed highway that was originally built for the horse-drawn vehicle. What of it? That's progress, isn't it? Certainly no fair-minded man would seek to measure the future worth of the commercial vehicle by comparing it with the original, or replacement cost of a portion of badly built road, and to the thinking people of every state in the Union such analogy appears to be political in its inception.

Just what is the influence behind those individuals who seek by restrictive legislation to hamper the development of the commercial vehicle? Are they actuated wholly by a sense of duty toward those who placed them in office? Or is it the ulterior motive of the "greased palm?" The motor truck is a developer—a giant that carries others to prosperity, and it is unfortunate that its destinies have to be even partially shaped by certain narrow-browed legislators, many of whom are acting on what appears to be the advice of a minority. Either that, or else they are holding one dollar so close to their eyes that they cannot see 10 a few feet away.

TRACKLESS TROLLEY BUS DEMONSTRATED

A TROLLEY bus designed to run in city streets without the use of tracks was demonstrated recently at the plant of the General Electric Co., Schenectady, N. Y., and was witnessed by over 100 well-known street railway officials and engineers.

A half-mile of double wire overhead was erected for the tests and the visitors spent the day examining the car and riding over the route. They were entertained at luncheon by the railway and traction engineering department of the company.

One of the interesting points in connection with the demonstration was the announcement that the first installation of the cars will be made in Richmond, Va., famed as the birth place of the first

same wire. The collector can be disengaged, swung off to the side and reconnected to the wire after passing the other car.

When running over the track area of the system—that is, when returning to the barn—the trackless bus is equipped with an adapter on the collector for connection with the standard overhead, and a magnetic shoe which fits into the trolley track groove, giving the necessary ground connection.

A 12-volt generator, direct connected to the motor, charges a 120-ampere hour, 12-volt storage battery, which lights two 21-candlepower head lights, a two-candlepower tail lamp and three low-voltage lamps inside of the bus. There are also two five-light circuits connected to the

Method of Lighting and Heating—Standard 600-Volt Electric.

Interior Trimming—Metal.

Roof—Arch.

Color Scheme (Outside)—Green.

Color Scheme (Inside)—White Enamel.

INDIANA STATE NORMAL SCHOOL TOURING EAST.

Indiana State Normal's "School on Wheels" is headed East on its annual summer tour. This year a 3500-mile trip through eastern states is scheduled. About 40 scholars from the normal school will accompany Prof. Breese, head of the geological department, the purpose being to study geological conditions in the eastern mountains and along the Atlantic coast.

The entire trip will be made by automobile. Two Reo Speed wagons fitted with bus bodies will, with a touring car, serve to carry the entire party. The baggage allowed has been limited to 35 pounds a person, but two dresses being allowed to each girl and no more than two suits for each man.

For the most part the scholars will sleep in the open, hammocks being carried, which will be pitched between trees at the evening camping spots.

From Muncie the "School on Wheels" will go directly to Niagara Falls, where the first stop is to be made for the purpose of studying the geological conditions in that vicinity. From there the party will head for the Adirondack mountains, spending three days in camp.

After leaving the mountains the Speed Wagons will carry the school to Maine, Massachusetts and New York, three days being spent in the latter city. From there the return trip will take a road through the Allegheny mountains, with a visit at the famous Horseshoe Bend.

The entire trip is scheduled to take 35 days, an average of 100 miles a day being covered.



Trackless Trolley, Equipped with General Electric Motors, Control and Collector, Passing Touring Car on 25-Foot Roadway.

successful electric street car in this country.

Description of Car.

The trackless trolley bus resembles in general appearance the present safety car and seats 30 passengers. Its speed is about 20 miles an hour. The electrical equipment consists of one G-E railway motor and a "K" type controller, arranged for foot operation and dead man control. The protective apparatus includes a circuit breaker on the positive side and a fuse on the negative.

Two overhead wires on 14-inch centers supply the current at 600 volts, and is taken into the car by a sliding type collector, which is manoeuvred by the motor man from his seat by means of a lever which disengages the collector from overhead and allows a leeway of 18 feet, nine feet on each side, for passing other vehicles.

This arrangement allows two cars to operate in opposite directions on the

main source of supply.

Specifications of Trackless Trolley Bus.

The bus demonstrated at Schenectady was built by the Atlas Corporation, York, Pa. A summary of the specifications follows:

- Seating Capacity—**30 Passengers.
- Standing—**15 Passengers.
- Length Overall—**24 Feet, Eight Inches.
- Width of Body—**Seven Feet, Four Inches.
- Height—**10 Feet, Four Inches.
- Head Room—**82½ Inches.
- Amount of Feet Occupied Per Seat—**5 1/3 Square Feet.
- Height of Bus Floor from Ground—**Three Feet, Four Inches.
- Height of Steps—**15 Inches (Two Steps).
- Tread of Wheels—**Four Feet, 8½ Inches.
- Drive—**Standard Worm.
- Wheelbase—**140 Inches.
- Tires—**Solid Rubber, Caterpillar Type.
- Seats—**Longitudinal and Cross.
- Width of Seats—**32 Inches.
- Width of Aisle—**18 Inches.
- Cross Seat Centers—**28 inches.
- Ventilators—**Atlas Special.

MOTOR SNOW PLOWS IN NORTHERN NORWAY.

The motor snow plow experiments have been successful to such an extent in northern Norway that it is expected that several municipalities will adopt this method next year, according to a report from Vice Consul G. G. Fuller, at Trondhjem. As the roads are the only means of communication for most of the country, and as they are often too narrow for two sleighs to pass, it is necessary that they be kept open. The first difficulty was to obtain powerful enough automobiles or tractors. The ordinary truck and even agricultural tractor have not sufficient power to draw the plows when the snow is heavy, and it seems to be the opinion that a four-wheel drive is essential.

REDUCTION IN STEEL PRICES.

The United States Steel Corporation has announced reductions ranging from \$2 to \$12 a ton in pipe and tube prices.

LARRABEE TRUCKS ARE WORM DRIVEN

LARRABEE-DEYO MOTOR TRUCK CO., Binghamton, N. Y., manufactures four heavy duty models of commercial vehicles as follows: Model U having a pay load capacity of 1½ tons, equipped with Continental N¾ engine having a bore and stroke of 3¾ by five inches and an S. A. E. rating of 22.5 horsepower; Model K, 2½ tons capacity, equipped with Continental C4 engine, having a bore and stroke of 4½ by 5½ inches and an S. A. E. rating of 27.2 horsepower; Model L, 3½ tons capacity, equipped with Continental E4 engine, having a bore and stroke of 4½ by 5½ inches and an S. A. E. rating of 32.4 horsepower; Model W, five tons capacity, equipped with Continental B2 engine, having bore and stroke of 4¾ by six inches and an S. A. E. rating of 36.1 horsepower.

Standard assembled units are used throughout which have been time tried. All models are equipped with Schebler carburetor, Bosch high-tension magneto and impulse starter, Duplex governor, Oaks fan, Ross steering gear, Brown-Lipe transmission, Sheldon axle, high carbon pressed steel frame, electric furnace chrome silicon manganese steel springs, Spicer universal joints, Bush radiator and Alemite system of lubrication on all slow-moving bearings.

The four capacities manufactured fit the majority of heavy hauling service, supplying purchasers with trucks that have passed through the experimental stage and have proven in actual road service to be adapted for general haulage purposes.

Ample Power Furnished by Continental Engine.

The company chose the Continental engine to furnish the necessary power for its various trucks after exhaustive tests extending over a period of several months and to prove the choice was well founded, testimonials from fleet owners as well as operators of one or two trucks attest to the economy and power of the power plant used in the Larrabee-Deyo trucks.

For fast suburban service and long-distance delivery, the 1½-ton truck chassis may be equipped with cord pneumatic tires, which allows the speed of the truck to be increased without decreasing the pay load. Many of this type of trucks are in use throughout the West and other sections of the country in bus work, running on regular time schedule between centers, carrying passengers and baggage. In this service it is said that the busses show remarkable efficiency, carrying the loads with a minimum of expense when the nature of the work is considered, as often the stage routes run through mountainous country, and that minor troubles rarely if ever occur which prevent the stages from reaching their destination on time.

The five-ton model is used largely in heavy construction, van, coal and kindred service. This model is usually equipped with steel cast wheels and power hoist, provided an end dump body

is used. This makes an ideal truck for many heavy duty uses where bulky material is handled constantly.

The company states that the materials which enter into the construction of each model are the best to be found for the purpose and that each part has been carefully designed in accordance with approved engineering principles to perform its duty most efficiently. These essentials have been wrought together with skilled workmanship under careful engineering supervision. The net result is a truck which gives dependable performance, day in and day out, insuring satisfied owners and repeat orders.

The Larrabee contract has been carefully planned to fit the dealer's territory and contains no catch phrases. It provides simply, in a few words, for the sale of as many trucks as the dealer can place in his territory.

When this operation is completed the type and size of tire is checked up to see if same comes within the state law for the weight recorded.

These tests not only enable the authorities to enforce the law, but they bring out the interesting fact that truck tire dealers are demonstrating their qualifications as transportation experts, for instances are rare, if not non-existent, where the truck's tire equipment has been found out of accord with state regulations, or the wrong size and type according to the standard of transportation engineers.

This is not surprising, for the truck tire dealer of today, when called upon to supply new equipment, first makes a careful analysis of all the conditions under which the truck must operate. The roads on which the truck must travel, its usual type of load and the truck's capac-



Larrabee Enclosed Cab Fltted with Electric Lights, 1½-Ton Truck Owned by the Texas Co.

HIGHWAY REGULATIONS CLOSELY OBSERVED.

With many states adopting legislation regulating truck tire equipment and carrying heavy loads on public highways, the authorities are becoming increasingly active in checking up to see that load limitations are not exceeded.

Under the plan first used by most states having such regulations motorcycle officers, when they suspected an operator to be piloting a load above the maximum, hailed the offender and all proceeded to a public scales. In the majority of cases the truck was not overloaded and the tire equipment was of the correct size and type. So considerable inconvenience, not to say expense, was unnecessarily involved.

According to a truck tire official of the Firestone Tire & Rubber Co., Akron, O., there is now coming into general use by these states an ingenious and most practical machine known as the loadometer, which is a combined jack and weight indicator. Placing one beneath each axle, the truck and load is lifted clear of the road and at the same time weighed.

ity are closely considered and then, having based his decision on tables prepared by tire and transportation engineers, the tire dealer recommends the type of tire—cushions or pneumatics—and signifies the correct size for the front and rear wheels respectively.

In this way not only is the interest of the public served to the extent of close cooperation in the matter of highway preservation, but the investment the truck operator has in his truck is protected as well when equipped with the proper size and type of tire.

MOTOR LORRIES IN JAMAICA.

The greater efficiency of motor lorries over mules and carts for heavy hauling in Jamaica is now well established. There were on hand last year four of these machines, states Consul Latham, and at the end of the financial year the number was increased to nine. Doubtless the number will be largely increased during the present year.

Two women were recently arrested for transporting stolen automobiles.

SELLEPHONE MESSAGES.

SQUARE MILES don't make a market. New Jersey is a pocket handkerchief beside Texas, but it does more retail business in a week than the larger state does in a year. Therefore, don't worry because your territory is small in size. Take a look at the number of people in it. That's the important fact.

BE THE BOSS. Don't let anyone in your employ dictate to you. Be the head of your business, but always bear in mind that knowledge is power, and only by having a thorough knowledge of a situation can you be its master.

ALWAYS INSIST ON HAVING your salesmen neat and well groomed. There are two reasons for this. One is that the unkempt, untidy looking salesman cannot radiate success; the other that "first impressions are frequently lasting." It isn't possible for every salesman to give Apollo a battle, but he can keep neat and clean, and that's better than looking pretty.

DON'T HESITATE TO GIVE CREDIT to the salesman who is working for your best interests. It will make him more efficient to know that his work is appreciated and he'll work all the harder. Thus you will be boosting your own game as well as showing a proper spirit. That's true co-operation all right.

KNOCKING THE OTHER FELLOW is something like giving a child a cannon to shoot a star with. It doesn't bother the star at all, but the recoil is tough on the kid. Some of us learn this early. Others never.

What



Every

Dealer



Knows

WHAT have you to deliver? The motor truck is now used for delivering everything from an yeast cake to a 10-ton bridge girder. This fact emphasizes more strikingly than mere verbal or written argument the fact that the truck has long since passed through the experimental stage and has taken its place as a necessary attribute to the business life of America.

The first lumbering motor trucks no more resembled the efficient machines of today than the first steamboat resembled the modern liner. In many cases they were merely the material excuse of the manufacturer to get in on the ground floor of a new and great industry. The public paid the bills consequent on experiment, but as the crude, inefficient machines made haulage more expensive than ever and increased the cost of doing business, the truck manufacturers were forced to develop a vehicle that would be of real service in solving the haulage problems. They proved equal to the occasion, with the result that today the commercial vehicle not only handles nearly all of the work that used to be done by horses, but is becoming recognized as a very potent competitor of the railroad. In fact there are miles and miles of track where no freight trains run today, simply because the shippers have found that they could make use of the motor truck as a cheaper and better means of conveyance.

Perhaps the truck is not yet perfect. The writer does not claim to know the unknowable. One thing is certain—it is the lowest priced hauler that we have today and, mathematically speaking, which is the one safe way to figure from a business viewpoint, does all that is required of it and a whole lot more besides. What greater development can you ask for a short generation of evolution? If all other lines of industry had progressed as fast, we should now be living in the golden age of achievement. Your prospects know that this is true. Remind them of it when you call to make a sale.

SALARY OR COMMISSION.

It's an old question especially in the case of automobile and truck salesmen. The straight salary is undoubtedly the best method of paying the average worker except perhaps in emergencies when it is necessary to turn out a lot of work in a short time. With regard to the salesman the point is debatable. In a business where the sales and profits assume large volume—where the demand for the product is not constant and must be created in the individual, the commission method is without doubt far more productive than the straight salary. The salesman must work hard to earn his pay and he naturally gives more attention to business. Furthermore, because he works harder he gets better pay than the average salaried man, and for this reason is usually more enthusiastic

over the proposition he is handling. There can be no question but that the commission method accomplishes greater results where the product is in the nature of a commercial specialty.

The salary basis puts the salesman on a sure basis, but it doesn't do as much for the employer unless he is serving a regular, stabilized trade that runs about constant from year to year. In selling automobiles and trucks which thus far are somewhat in the nature of a specialty, it appears from a careful review of the matter that the only equitable way by which the interests of both salesman and employer can properly be served is to pay a small salary and commission. This will give the salesman a chance to "get by" when things are breaking bad, and will also safeguard the employer.

TRUCK FARMERS AND TRUCKS.

A peculiar condition in the distribution of population has come to light with the compilation of recent census figures. At first glance this census appears on the face of it to be merely a statement of ordinary facts. But it is more than that. In effect it is a statement of extraordinary facts of serious importance, because it shows that, whereas in the previous censuses, extending over nine decades, the growth of city and country population has been proportionally equal, the figures are now shifted and the cities are growing far faster than are the farming districts.

This is occasioned in part by the fact that many new comers to these shores have settled in the urban territories, but the greatest reason for the change is that Americans who formerly lived on the farms have moved to the city. Thus the city has gained only at the expense of the country.

The fact itself is insignificant perhaps, but the effect is of grave moment because it means that the country districts must not only supply more food and clothing, but they must supply it with decreased labor.

If the farming industry, was organized and run along

modern manufacturing lines this condition of affairs would be all right; in fact, it would be welcomed because production methods would be developed to cope with the situation. But for some one major reason out of the 10,000 given by those who claim to know, the farmer apparently is not as progressive as he should be, and it will be interesting to note how he handles the situation during the next few years.

One thing is absolutely certain. He must avail himself of the time and labor-saving features offered by the motor truck if he is to keep pace with the demands of the industry. Economic necessity dictates this, which is a good reason, as evidenced by the foregoing.

Therefore, NOW IS THE TIME TO GO OUT AND SELL HIM A TRUCK. YOU CAN SHOW HIM THAT HE MUST HAVE IT AND IF YOU GO ABOUT THE MATTER IN A LOGICAL WAY YOU CAN GET HIS CONTRACT AND A CHECK TO BIND THE BARGAIN. BUT DON'T TRY TO ARGUE HIM INTO MAKING A PURCHASE. EDUCATE HIM.

PRIDE OF POSSESSION.

The "raiment oft proclaims the man." With regard to the truck sales and service station it is safe to make the quotation a positive one and leave the second word out of the picture entirely, because experience has shown that the dealer's business methods may be accurately gauged by the exterior appearance of the building that houses his agency.

A man doesn't have to do business in a commercial palace. He may do as much in a barn. The architectural design of the building has no material effect

on the number of trucks sold or the method by which they are sold. But the way in which the building is taken care of makes a world of difference. A coat of paint to start with, a judiciously applied broom and a large amount of hot water to follow it up—that's all you need to tell the world that you are taking your business seriously. The well-kept truck sales and service station is a sign board that advertises the truck industry, and it must be kept looking right if it is to put the message across in proper style.

SUCCESS AND SERVICE.

Whether a man runs a railroad or an undertaking parlor, his success depends on the service he gives. The experienced man can judge the degree of service you give by talking with your customers. They either make or break you. The principle of success as gov-

erned by service is so delicately adjusted that business prospers or fails according to the extent that service is made the governing factor. This law is an old one and is as unchanging as the law of mathematics. Incidentally, it is based on courtesy. The rest just follows on.

PAGE MR. ENTHUSIASM.

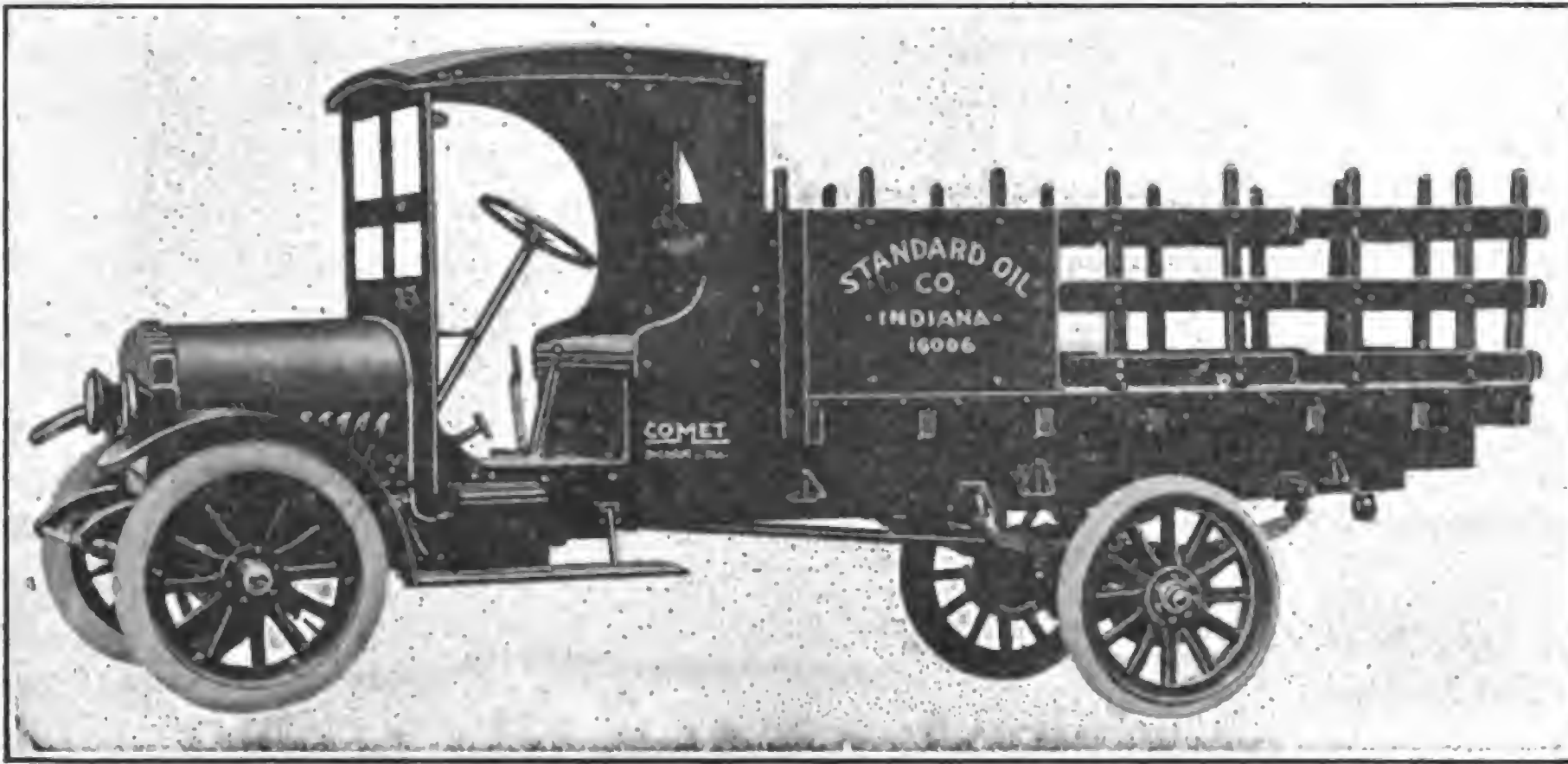
Enthusiasm is the bat that hits the ball of selling. It accounts for more home runs in the game of life than any other player. It adds dollars to the gate receipts of success and furnishes a free pass to the right-hand box in the world's series of achievement.

Enthusiasm never tires. Neither does it weaken. It is strong in doing good with an ever increasing strength. It is contagious and wants the world to know what it can accomplish.

It is the "genius of sincerity"—and truth wins no victories without it. It is the mystic power that transforms mediocre men into successful citizens. It is spontaneous, unchanging. And linked with a little knowledge, a modicum of thought and an inherent desire, it will carry the truck dealer and all his salesmen to new heights of prosperity.

Try a little of it on your next prospect. You'll be surprised.

NEW COMET ONE AND ONE-HALF TONNER



Comet Truck Fitted with Stake Body, Cab and Solid Tires Rear.

COMET AUTOMOBILE CO., Decatur, Ill., is in production on a 1½-ton truck that is designed especially to meet general haulage needs for city, town or country transportation. The truck embodies many time-tried features besides being made up of units that have been proven in actual service to be well adapted to general service work.

The engine is a Lycoming, four-cylinder, four-cycle, L-head, vertical type, having a bore of 3½ inches and stroke of five inches and developing 38.6 brake horsepower. The cooling is by means of the well known thermo-syphon system, while the lubrication is by a combination of pressure feed and splash.

The clutch is the Borg & Beck 10-inch dry disc type, and is mounted in the fly-wheel housing, while the transmission is of Muncie manufacture, selective type, three speeds forward and one reverse, in a unit with the engine and clutch and fitted with ball bearings. The control is located in the center of the floor at the driver's right.

Chassis Units Unusually Strong.

The frame is of pressed steel, hot riveted at all joints and heavily reinforced with steel cross members. The springs are semi-elliptic front and rear and made of special alloy steel. The front springs are two inches by 36½ inches long and the rear three by 50½. The steering gear consists of a worm and complete worm gear, while the steering is 1¾ inches in diameter and is fitted with an 18-inch steering wheel.

The radiator is mounted in the conventional position in front of the engine, fitted with deep cellular core and cast iron shell.

The front axle consists of a heavy I-beam section forged from special alloy steel. The rear axle consists of a triple-thread worm and worm wheel, standard type, mounted on annular ball bearings and is of sturdy construction. The final gear ratio is given as 7¾ to one. The drive to the rear axle from the transmission is through a hollow propeller shaft fitted with two universal joints.

Both brakes on the rear wheels are operated internally, expanding into the brake drums of the wheels. The brake bands are unusually wide, provide un-

usual braking surface and are capable of holding the loaded truck under all conditions of work. All brakes are equalized and operate on 14-inch by 2½-inch brake bands and drums.

Ignition for the engine is furnished by a Dyneto generator fitted with Delco distributor and coil in connection with an 80 ampere-hour storage battery. The starter consists of a Dyneto starting motor fitted with Bendix drive which operates through a ring gear on rim of fly wheel.

Electric lights are furnished with this truck, operated through a Delco switch.

The wheelbase of this truck is 130 inches and the tread 56 inches. The wheels are equipped regularly with solid tires front and rear, 34 by four-inch or optional, pneumatic front and solid rear.

The length of the frame back of the driver's seat is eight feet six inches and permits the mounting of a body 10 feet long.

Regular equipment includes head lights, tail light and electric horn. The driver's seat is fitted with a lazy back.

TRANSFORMING CATALINA ISLAND.

Catalina Island, the gem of the Pacific ocean, where the famous submarine gar-

dens, seals and leaping fish attract thousands of visitors the year round has been a veritable bee hive of construction activity during the past summer season.

Where, up to two years ago, the use of motor vehicles was entirely forbidden, facilities have been provided to permit the motor truck to aid materially in the extensive improvements that are now being made. Although the mileage is not very great, time is a deciding factor and the advantage possessed by motor trucks as time savers as well as economizers is appreciated. The town of Avalon, located on the island, has built a large gas reservoir, and a two-ton Mack truck, owned by Wellman & Lewis of Los Angeles, was used continuously during the course of its construction. Another Mack, of 3½ tons capacity, owned by W. H. Kelley of Los Angeles, hauled hundreds of tons of rock and soil to aid building a new \$100,000 casino that will provide accommodations for the rapidly increasing number of visitors. In connection with erecting this casino it was necessary to put in a big fill on the water front as a means of protection against the devastating waves. At Catalina the Pacific is a contrary ocean and at times the surf is very destructive. This 3½-ton Mack, equipped with a dump body, is working daily at the task in the interests of those who will enjoy the pleasures to be afforded by the casino.

CENSUS OF RUBBER-WORKING AND ROAD-MAKING MACHINERY.

A preliminary statement of the general results of the 1920 census of manufacture shows that the number of establishments making road-making machines in 1919 was 43, against 31 in 1914, and the value of the product was \$13,915,000 in 1919 compared with \$3,545,000 in 1914.

The figures for rubber-making machinery are as follows: 51 establishments in 1919 against 14 in 1914; value of products, \$13,302,000 in 1919 against \$2,726,000 in 1914.



Mack 3½-Ton Truck, Owned by W. H. Kelley of Los Angeles, Cal., in Construction Work, Catalina Island.

An Authoritative Summary of Automotive Situation

SURVEY BY METROPOLITAN BANKER SHOWS SUBSTANTIAL PURCHASING POWER FOR AUTOMOBILES AND TRUCKS—BANKS GENERALLY HAVE BEEN LIBERAL WITH THE INDUSTRY—THINKS NEW PRICES REPRESENT EXTRAORDINARY VALUES—STABILIZED PRICES NEEDED TO STIMULATE TRADE.

President Bizallion of the Gotham National Bank, which handles more retail automobile accounts than all other New York banks combined, writes the following letter to the National Automobile Chamber of Commerce in which he offers some comprehensive and constructive thoughts of timely interest. This letter should be read by every person connected with the automotive industry, as it is a summary that has been carefully thought out by one of the few men who is in a position, through experience and first hand knowledge, to know every phase of current conditions in connection with the business of merchandising automobiles, and as such can be applied to all branches of the business.

THE GOTHAM NATIONAL BANK,
New York.

June 25, 1921.

Mr. Alfred Reeves, General Manager,
National Automobile Chamber of Commerce,
366 Madison Avenue,
New York.

Dear Sir:—

As we handle more automobile merchants' accounts than all other banks in New York combined, we are deeply interested in the continued prosperity of the retail automobile business. This interest is very direct in that many of these dealers have been our customers for the past 10 years.

Price adjustments in the automobile business, the same as in other lines of industry, were inevitable and we are very glad to see that these adjustments came in much more orderly fashion than they did in other industries. According to your price lists all the readjustments seem to have been accomplished except for a few announcements that I understand will be made around July 1st. The object of this letter is to learn whether you have any assurance from manufacturers that all price readjustments shall be made by July 1st, so that the public will realize that the new prices are to continue over a substantial period.

Would it not be well to suggest to all manufacturers that while no guarantee may be necessary, it would seem highly important to the prosperity of the retail trade that manufacturers endeavor to prove to the public that the present prices are excellent values, that in some cases they are made at a substantial but necessary loss during the readjustment period, and that for these reasons no further changes may be expected unless they are upward?

Bankers Respect Industry and Have Been Liberal With Credit. No Losses in 10 Years of Financing Automobile Dealers.
During the past few years the banking

fraternity has been led to look upon the automobile industry with the greatest respect, not alone because of its volume, but because of the energetic manner in which it has been conducted and our high appreciation that cars and trucks are now permanent necessities in our American life. Banks generally have been liberal with their credits to the industry, curtailment coming only in a few districts and in a few cases where the dealer was not entitled to credit, irrespective of the product he was selling.

We take pride in the fact that in 10 years of financing automobile dealers to the extent of many millions of dollars, we have never had a dollar's loss except in one instance where fraud was committed.

Survey Shows Substantial Purchasing Power—Stabilized Prices Needed.

Our interest in the retail selling field has led us to make a survey which shows:

1. That there is a substantial purchasing power available for motor cars in particular, and to some degree for motor trucks, particularly in connection with new building operations that are now getting under way.

2. Buyers generally are waiting for the final adjustment of motor car prices, to be assured that when they do buy the price will not change a few weeks later.

3. It is the hope among dealers that all manufacturers who contemplate price adjustments will do so promptly and with the full understanding of the requirements of the next six or eight months.

4. While guaranteeing prices may have many bad features, the makers should endeavor to impress the public with the new values in motor cars and to show that the industry has now been stabilized after these mid-season price changes, that no more changes are probable and, moreover, that if there should be any further price changes it would

more than be offset by the reduced value of the car which the average buyer now has to trade.

Believes New Prices Represent Extraordinary Values in Motor Cars.

From our survey of the field it would appear that the new prices represent extraordinary values in motor cars because they are so little above the pre-war prices, to say nothing of the fact that many of these new models are better equipped, better made and better finished than the products of five years ago.

While I appreciate the difficulty of concerted action by nearly 200 manufacturers of motor cars and motor trucks in an industry as big as yours, the National Automobile Chamber of Commerce has been such a constructive force for so many years and the automobile industry is in so much better shape than the majority of trades in this country, that I hope your organization will undertake to convey to its members some of those things which I am prompted to suggest because of our high interest in the motor car sales in the eastern territory.

Asks Whether Manufacturers Can Give Assurance of Continuation on Present Basis.

Can you, or through you, can the manufacturers give us any assurance of a continuation of operations by the manufacturers on the present basis of prices and values? Some certainty along these lines will materially help the dealer in his plans for maintaining his organization and sales work that would permit broader plans for financing his requirements on the part of banks and ultimately be for the best interest of the public, the manufacturer and the retailer.

Please be assured of the readiness of our bank to render every possible assistance in the solution of this problem for further stabilization of the automobile industry.

Yours very truly,
(Signed) H. H. BIZALLION,
President Gotham National Bank.

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voice is received and has been O. K'ed. it is entered upon this form, entering the date of the invoice, name of the manufacturer, the invoice number, the gross amount and the date due and terms. When the invoice is paid the date on which it is paid is entered, the amount of the discount and the net amount of the invoice. At the close of the day you will total the amount of invoices entered that day and enter the total in the col-

When accessories are used the workman will go to the accessory department and call for the articles needed and the accessory clerk will make out a sales slip charging the owner of the car with the accessories and marking on the slip the name of the workman receiving them. This sales slip will go to the office the same as any of the other sales slips and the accessories and marking on the slip credit for the sale. The "Repair Department" will receive credit only for the labor charge and not receive credit for the amount of accessories used. When the labor ticket comes into the office the two tickets will be compared and see that all accessories used are charged.

Form No. 7 is an "Invoice Register" and provides for keeping a record of all invoices and shows the total amount of all accounts payable. As soon as an in-

TRANSPORTATION FEATURED IN THE PAGEANT OF PROGRESS

Transportation, the progress of which marks the advance of civilization, will occupy the place of honor among the exhibits at the great Pageant of Progress exposition, to be held July 30 to August 14 on Chicago's \$5,000,000 municipal pier. As it is the largest factor in man's progress, it will furnish the largest exhibit in this history of man's progress. More than 22,000 square feet, nearly 1/7 of the entire exhibition space, will be occupied by the automotive section, of which Charles S. Rieman, president of the Elgin Motor Car Corporation, is the chairman. It will include passenger automobiles, trucks, tractors, air planes, motor boats, motorcycles, tires, accessories and lubricating and fuel oils, and will be the most complete and most attractive exhibition of automotive products ever assembled under one roof.

In the educational section of the display a complete history of transportation will be shown by small working models, beginning with the old two-wheeled ox cart and progressing up through the wagon, buggy, bicycle, automobile and air plane. Some of the early models of various vehicles will be shown, clearly visualizing for visitors the strides transportation has made since history began to be recorded.

The International Harvester Co. will show the first reaper, the same model which was exhibited at the world's fair and in London, alongside one of its great modern machines, which will demonstrate the remarkable progress made in the development of agricultural implements.

Passenger Cars and Trucks.

Giant motor trucks, some of which will carry almost as much as a railroad freight car, with ingenious power dumping mechanism, will be on exhibition. In the passenger car section more than 100 attractive motor thoroughbreds will vie with each other for the attention and interest of the visiting throngs.

The air craft division of the section is the one perhaps the dearest to Mr. Rieman's heart, as he has launched a movement, in which he has the active support of Mayor William Hale Thompson, president of the Pageant of Progress exposition, to make Chicago the center of the rapidly growing air craft industry. Every effort is being put forth to induce manufacturers of air craft and air craft parts, accessories and materials to locate their factories in Chicago.

Mr. Rieman has drawn a parallel between the status of the automobile industry a few years ago and that of the air craft industry today, and has shown the enormous value that the industry will be to the city that is fortunate enough to become its recognized center, as Detroit is the center of the automobile industry. He hopes Chicago will eventually be the hub of the air craft world, as it is today the greatest railroad center, in the belief

that air travel, the transportation of mail, express and freight by air will eventually develop to enormous proportions and make the air craft industry one of the greatest in the world.

Some Surprise in Air Craft.

Mr. Reiman is working on some surprise in the air craft division. It is reported that a machine which rises straight up in the air, without wings, will be shown. Another possible spectacular feature will be the giant dirigible air ship recently built in England for the United States Navy department. Captain William A. Moffatt, former commandant of the Great Lakes Naval Training station, and now director of naval aviation, has promised to fly the dirigible to Chicago if it arrives from England before the exposition opens. It has made successful trial flights and the American naval crew is now learning the intricacies of its management.

Conversion of Crude Oil Into Gasoline.

Sheldon Clark of the Sinclair Oil Co. has arranged an interesting exhibit of the methods by which crude oil is converted into the various products of petroleum, such as gasoline, benzine, lubricating oils, coal tar products and other materials.

Mr. Clark, in his capacity as commodore of the Chicago Yacht club, is also in charge of the speed boat races to be held for four days during the exposition. Some of the fastest boats in America have been entered for these events.

OHIO ESTABLISHES TRUCK RESTRICTIONS.

The governor's signature to the Burke bill, which virtually prohibits all motor trucks with a capacity greater than 3½ tons from the use of the highways, has placed Ohio in a class with those states that are doing much towards legislating trucks off the roads. It is unfortunate that this condition is getting such a strong hold in the various parts of the country.

In the case of Ohio it is said that great pressure was exerted by automotive interests to have the measure vetoed, but these attempts were futile. The measure forbids the use of roads in the state by rubber tired vehicles weighing more than 20,000 pounds, including load. Another section of the bill permits additional restrictions by municipalities.

Automotive interests contended that the result of the bill would be that 3½-ton trucks would be overloaded and operated at a speed which would wear out the highways faster than heavier trucks with a normal load and, according to all available data, they were justified by facts in taking the stand that they did.

Walter C. Guilder has resigned as general manager of the truck and tractor division of the Traylor Engineering & Manufacturing Co., Cornwells, Pa., after a connection of two years. He has organized the Guilder Engineering Corporation, Poughkeepsie, N. Y., which will specialize on the design and development of trucks and farm tractors.

SYSTEMATIC TRUCK INSPECTION ASSURES HIGH-GRADE SERVICE

In order to assure high-grade, uninterrupted service, every motor truck should be overhauled at least once a year and all parts showing undue signs of wear, replaced. The spring of the year is the logical time for annual overhauling, while many trucks operate the year around, the heavy hauling season is, generally speaking, the fall and winter months.

In overhauling an engine the condition of the very important units, such as the carburetor, magneto and governor, is frequently taken for granted, and attention is given only to burning out carbon, taking up bearing and similar work.

It is very essential in a first-class overhaul job to be sure that the gasoline feed system is thoroughly cleaned. The sediment trap should be removed, disassembled and every trace of dirt washed from the screens and interior. The gas line should be cleaned thoroughly, the pipe line examined for leaks or bends which will obstruct the flowage of fuel and the carburetor should be disassembled at a carburetor service station handling the type of carburetor used, and should be inspected and cleaned. When assembled again special attention must be paid to seeing that the choker wire is properly connected and working correctly.

Fully 90 per cent. of carburetor complaints originate from need of cleaning and too much tinkering.

Magnetos should be rigidly inspected, preferably by a station servicing that special make of magneto. The breaker points may need adjustment and the magneto must be kept clean, or ignition trouble will follow. The terminals should be kept tight and the spark plug wires should be promptly replaced when the insulation becomes worn or cracked.

Oil should be used sparingly on the magneto. It is better to use a small amount than too great a quantity. Too much oil is one of the chief causes of magneto trouble.

The governor should be flushed out and cleaned with kerosene. The draining should be removed after the oil has drained out and kerosene forced into the filler plug hole with a pressure oil gun. If the gun is not available a quart of kerosene should be poured in and after this has drained, replace the drain plug and fill the governor with a light grade of motor oil.

The governor should only be disassembled by a station servicing that special type with which the truck engine is equipped, for if the work is performed by workmen not connected with the station the guarantee on the governor is usually void.

Truck owners are urged not to allow their trucks to start the second year of service without knowing that they are in the best possible condition, and the only way to be sure is by a thorough inspection. Motor trucks can stand much abuse, but continued neglect is costly.

WHITES CELEBRATE ANNIVERSARY OF AUTOMOTIVE ACTIVITIES.

Windsor T. White, chairman of the board of directors, and Walter C. White, president, of the White Co., Cleveland, O., were the guests of the branch managers of that company at a banquet recently held at the Union club, Cleveland, O., in honor of the 20th anniversary of their activities in the automotive industry.

Other guests, prominent in the civic, industrial and financial life of Cleveland, were Alexander C. Brown, president of the Cleveland Chamber of Commerce, Rollin H. White, president of the Cleveland Tractor Co., and the following directors of the White Co.: Homer H. Johnson, Otto Miller, Warren S. Hayden and A. R. Warner.

A feature of the banquet was the presentation to the Messrs. White of a working miniature model of the first White steam car, the presentation being made by J. S. Hathaway of Boston, who is New England manager of the White Co., and the oldest branch manager in point of service. Incidentally it was made known that Mr. Hathaway has shipped to Cleveland for use in the city's 125th anniversary celebration, one of the original steam stanhopes which Mr. Hathaway personally owns and has maintained in running condition.

George A. Urquhart of San Francisco, Pacific coast manager of the White Co., was the toastmaster. The speakers were Colonel Clifton, Alexander C. Brown, Fred S. Borton, David Beecroft, Homer H. Johnson and Warren S. Hayden.

PRODUCTION INCREASING IN TIRE FACTORIES.

Production of tires in the Mason tire factory at Kent, O., is now running at 1500 a day. About 90 per cent. of the entire production is cord tires. Sales for May were in excess of May of last year. More men are being employed than ever before.

The Firestone Tire and Rubber Co. has increased its production to 21,000 casings and 23,000 tubes a day, approximately at a prewar normal level.

The Miller Rubber Co. has attained an output of 4500 tires a day.

Business coming from every section of the country, except the South, occasions the increases. Buying has been resumed on a large scale in the West, where it has been slow.

INDIA RUBBER CHANGES NAME.

In accordance with a recent favorable vote of the stockholders of the International India Rubber Corporation, South Bend, Ind., the board of directors has announced the official change of name to the Odell Rubber Co. This change in nomenclature will in no way affect the business of the company, merely fulfilling a desire for a shorter, more euphonious name conforming to the trade name of the principal product of the company, Odell cord tires.

New Fisk Automotive Office Building in Heart of Metropolis

The new Fisk building at Broadway and 57th street, New York City, which has been in process of construction for the past year for the Fisk Rubber Co., whose factory is at Chicopee Falls, Mass., was recently dedicated and is now being occupied by various automotive industries who have been desirous of securing proper headquarters in the heart of the metropolitan automobile district.

The new Fisk building occupies all of the southerly West 57th street block front between Broadway and Eighth avenue, replacing two historic apartment house structures. This building is 25 stories in height and is the tallest north of the Times square section. The estimated cost of the building, including the land, is reported to be between \$7,000,000 and \$8,000,000.

The architects were Carrere & Hastings and R. H. Shreve and the construction work was by Fred T. Ley & Co.

The Fisk Rubber Co. has commodious executive offices in the new structure and the remaining office space is in the hands of the Cross & Brown Co., 18 East 41st street, for rental purposes, etc.

It is needless to say in regard to the new Fisk building that every appointment and every feature of equipment is provided to give service of the highest character. No office building in the Me-

topolis can offer more in way of luxury and convenience. The floor plan is unique in that on account of an unusual frontage of 400 feet on three streets, each 100 feet wide, a design has been possible whereby less than six per cent. of the area on each floor is further than 30 feet from an outside window.

Its proximity to adequate transportation facilities is also worthy of mention, as it is within 900 feet of stations of the Interborough subway, the Elevated lines and the B. R. T. subway from Brooklyn through downtown Manhattan to 57th street and across to Long Island City. It is equally accessible by motor, Fifth avenue bus or other transportation.

The construction of this immense office building, through the initiative and energy of the well known Fisk Rubber Co., is a marked illustration of the rapid transformation of New York's 57th street from a residential section to a business thoroughfare.

LAMPEE JOINS HARVESTER TRUCK

T. C. Lampee has joined the Boston branch of the International Harvester Co. of Chicago as sales manager in that territory. Mr. Lampee has a wide acquaintance in the motor industry.

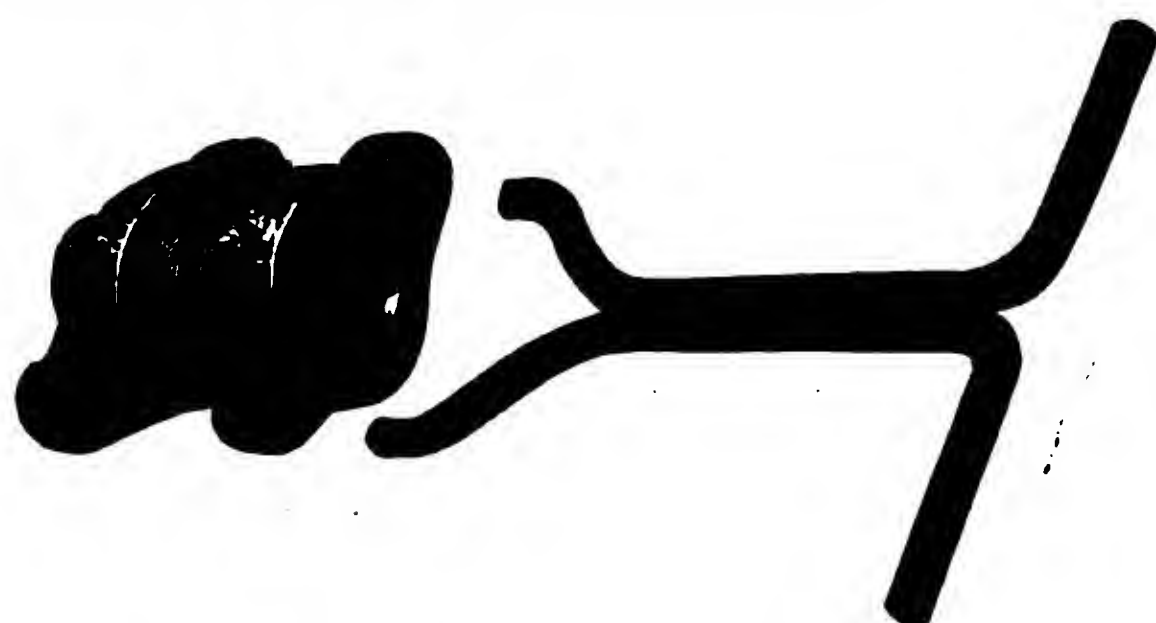
Mammoth New Office Building in New York City Built for the Fisk Rubber Co.



Garage and Service Station Machinery, Tools and Equipment

CLUTCH PULLER.

The Stewart Manufacturing Co., Inc., Oakland, Cal., announces that it has perfected a clutch puller especially designed for pulling the clutch on Chevrolet one-



ton, Oldsmobile one-ton and the Samson 1½-ton trucks. It is stated that the time and labor saved on the first job will easily pay for the cost of the puller and once used it will be found an almost indispensable tool for this work.

SPRAGUE ELECTRIC HOISTS.

The Sprague Electric Works of the General Electric Co., 527-531 West 34th street, New York, is showing its one-ton capacity electric hoist mounted on a monorail which is adapted to large service stations and repair shops handling heavy work.

The casing of the hoist is composed of two circular iron castings bolted together with sufficient space between to contain



the motor, controller and drum, which are enclosed by sheet iron covers. This frame is provided with suspension lugs for the support of the hoist. All bearings are roller type, packed in grease, requiring lubrication only at intervals of several months.



SWAB for applying attached to cork

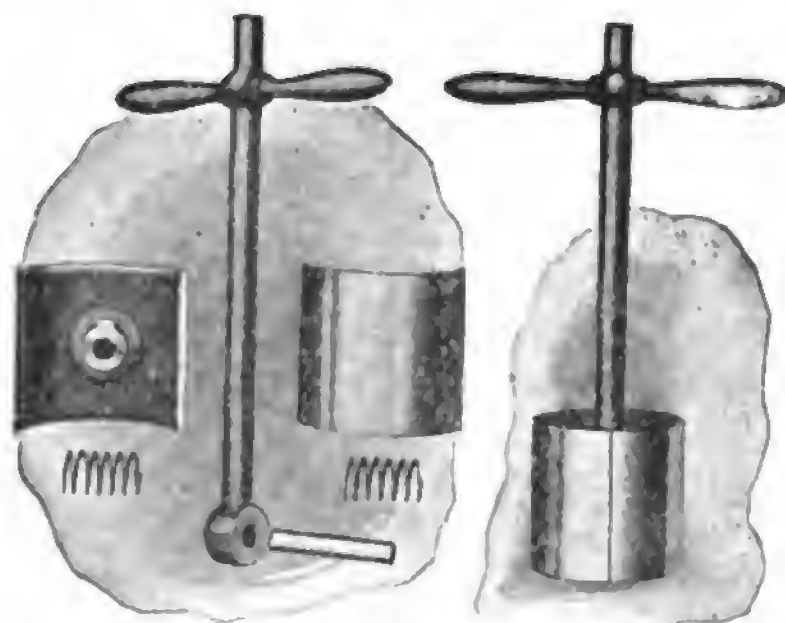


BLUE DEVILS CLERZIT.

The American Povar Corporation, 530 West 58th street, New York City, manufactures a fluid which is finding a ready sale among motor truck and passenger car drivers from the fact that a small quantity placed on a cloth and rubbed over the windshield prevents the shield from fogging in rain or snow, allowing a clear and unobstructed view of the road. It has been found that one application has kept the windshield clear from 18 to 24 hours.

CYLINDER LAPPING TOOL.

The Clover Manufacturing Co., Norwalk, Conn., has developed a cylinder lapping tool which may be used in electric grinders, drill presses or by hand. It is made in the following sizes, which are

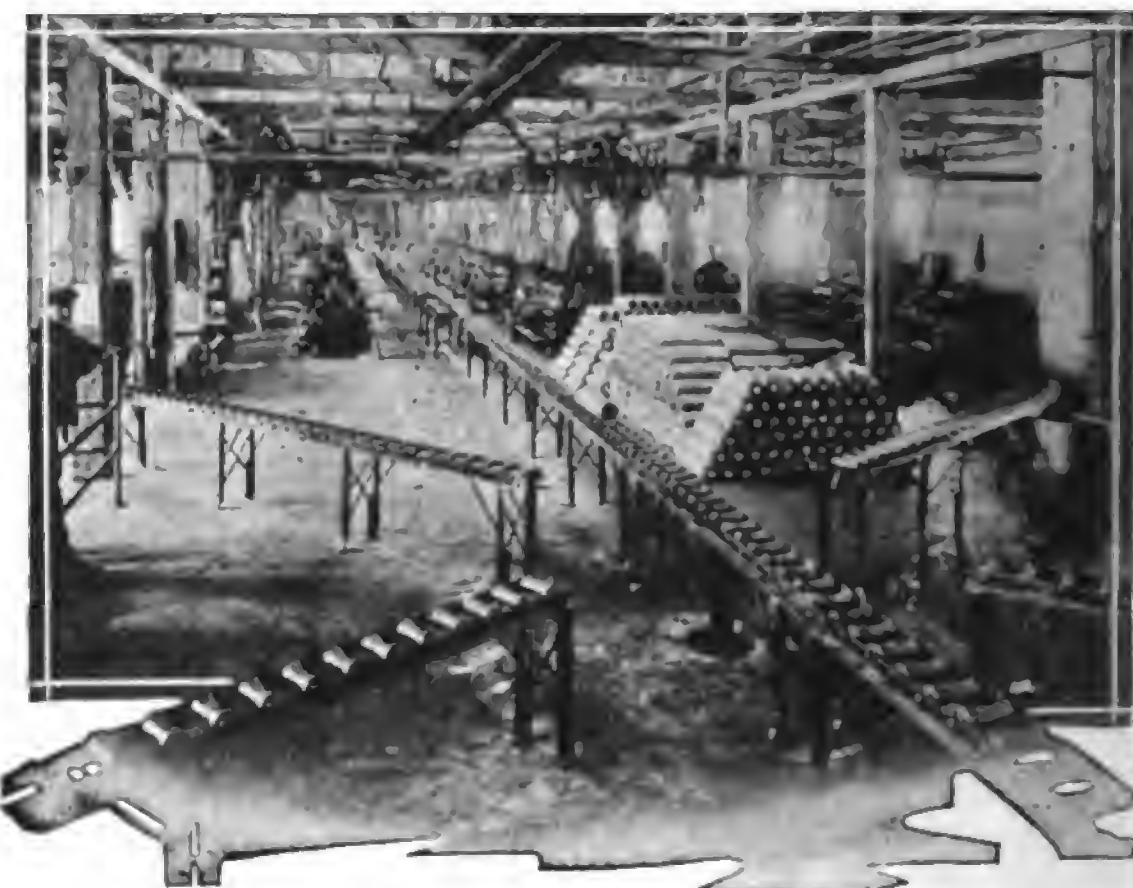


stated to cover 90 per cent. of all cars and trucks in use: 3¼, 3½, 3½, 3¾ and 3.775-inch.

SHOP CONVEYORS.

The Standard Conveyor Co., North St. Paul, Minn., shows its standard conveyor in use in the factory. The uses of this type of conveyor are numerous, as of late, the gravity type of conveyor has come strongly to the front as an ideal

method of handling parts and units from one section of a room or building to another. Provision is made for shifting the units from one conveyor to another by means of a turntable, located at a con-



venient point where the conveyors center. Turning the table allows the units to pass by on to whatever conveyor the operator desires.

ALL-STEEL-EQUIP TOOL STANDS.

The All-Steel-Equip Co., Aurora, Ill., is stocked in four sizes on its tool stands for garages, service stations and machine shops. They are as follows: No. 300, 18x24x32 inches; No. 301, 22x26x32 inches; No. 302, 24x30x32 inches; No. 303, 24x36x32 inches. They can also be secured in different sizes to meet any special requirements.



They are shipped knocked down, but their assembly is very simple.

The trays are No. 16 gauge and have a two-inch flange (upward) on all four sides. The legs are 1½ by 1½ by one-eighth of an inch angle and extend three inches below the bottom tray. All the legs are punched for casters.

New Motor Truck Accessories

WHYTE MOTORCONTROL.

The Whyte-Duffield Manufacturing Co., 13th and Michigan avenue, Chicago, Ill., announces a new method of motor truck engine control which eliminates the dash control and instruments, placing them on the center of the steering wheel post. The unit contains the speedometer, oil gauge, ammeter, electric control switches,



horn button and any other indicating mechanism that may be standard equipment of the truck. That such an arrangement of the control mechanism is convenient for the driver is obvious. With the Whyte Motorcontrol the driver need never let his eyes leave the road in performing any of the control operations, an advantage of having the indicating mechanism in line with the vision.

LOOKBACK MIRRORS FOR MOTOR TRUCKS.

The law in many states makes it compulsory for motor truck owners to equip their trucks with mirrors which give an unobstructed view in the rear. To meet these conditions the Lookback Co., Rush-



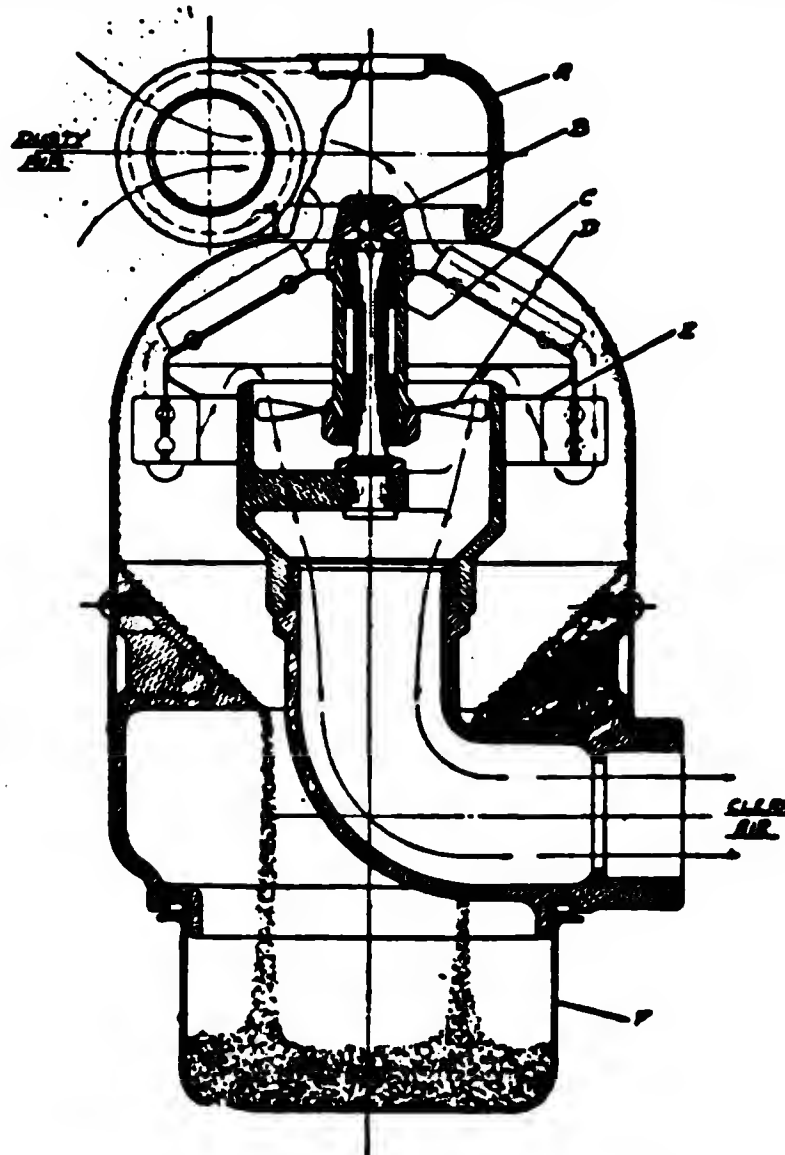
ville, Ind., has designed a special mirror for motor trucks which fulfills these conditions.

The mirror is equipped with a patented ball joint which is a feature of the Lookback mirror and gives to the mirror a greater range of vision as it is positioned near the rim, and allows instantaneous adjustment from the driver's seat.

CENTRIFUGAL-TYPE AIR CLEANER.

The United Manufacturing & Distributing Co., Lake Shore drive, Chicago, Ill., manufactures a new device which is called the Centrifugal-Type Air Cleaner, which is automatic in action except the emptying of the dust receptacle.

The air enters at the top, passes over a rotor turning from 6000 to 7000 revolutions a minute and continues, as shown

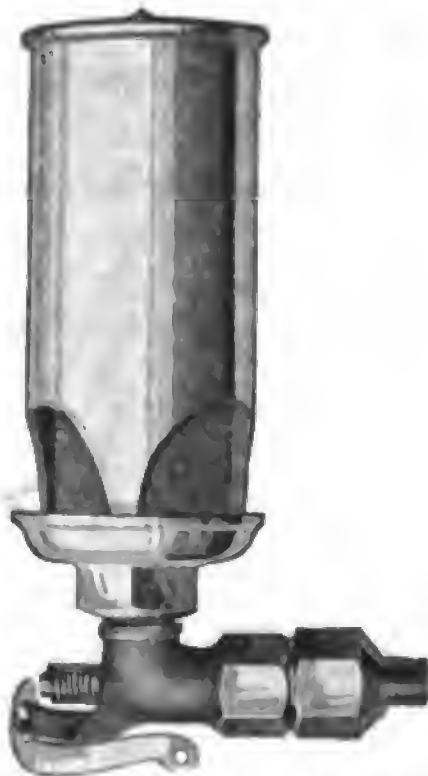


in the diagram. A centrifugal action is given the air by the fins and the line of the rotor, which throws the dust to the wall of the cleaner, around which it whirls to a deposit duct at the bottom.

It is of course necessary to readjust the carburetor after attaching the cleaner and test charts of engine markers show no loss of power where the United cleaner is in use.

EXPLOSION WHISTLE FOR TRUCK ENGINES.

The Buell Manufacturing Co., Cottage Grove at 30th street, Chicago, Ill., manufactures a complete line of explosion whistles for motor trucks and passenger cars, consisting of several patterns,

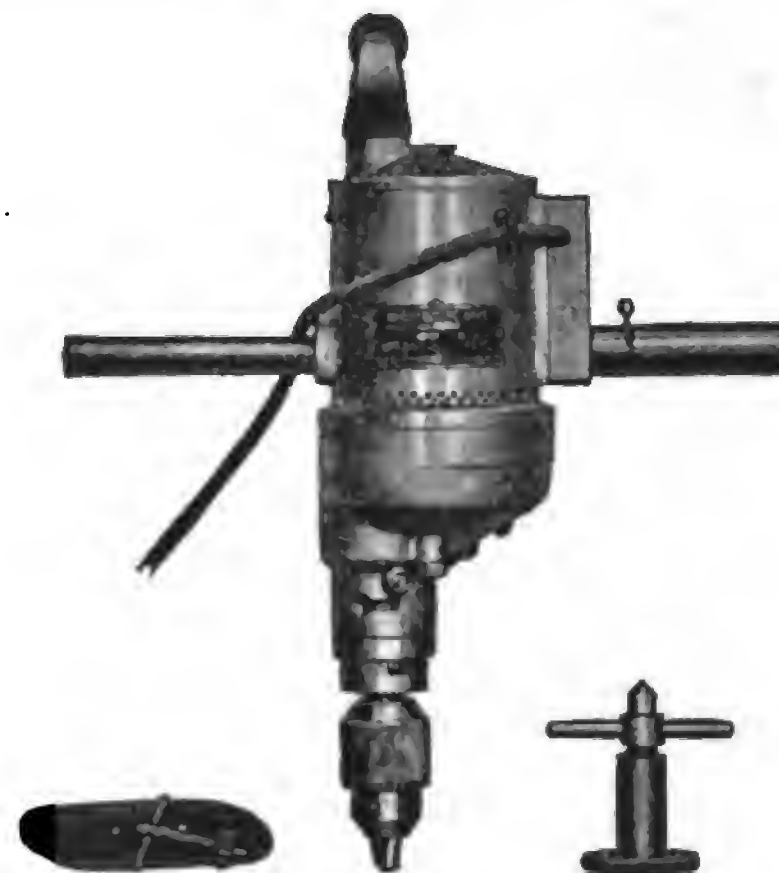


which may be attached to the engine cylinder in place of a pet cock. A cord connects the valve handle of the whistle to the steering wheel, allowing the driver to operate the whistle at will.

The whistles are made in single tone and chime and with straight or offset connection, and a special spark plug whistle is made for the Ford engine which combines the plug and whistle in one unit.

WILLEY ELECTRICALLY-DRIVEN PORTABLE DRILL.

James Clark, Jr., Electric Co., Louisville, Ky., manufactures a complete line of portable electrically driven drills which may be operated on either alternating or direct current. The drills are equipped with two speeds or gear reduc-



tions, providing a low-speed, high-torque drive for large drill bits and a high-speed, low-torque drive for the smaller sizes of drills. Shifting from one to the other is a matter of a few seconds as no tools are required.

For a garage or general repair shop where the volume of work does not justify the purchase of several sizes of single-speed drills, these two-speed drills are ideally adapted.

APEX ENGINE TONGS.

The Apex Manufacturing Co., P. O. Box 43, Elizabeth, N. J., is manufacturing a set of tongs which fit the Ford,



Overland 4, Chevrolet and Maxwell engines, which proves a time and labor saver in lifting the engine from the chassis when overhauling operations are under way. The tongs are provided with a spring that holds them in place on the engine, preventing them from slipping.

N. A. M. T. S. M. DISAPPROVES "FACTORY TO USER" POLICY

BELIVES PLAN UNFAIR TO GENERAL INDUSTRY AND BRANDS IT AS IMPRACTICAL—WILL LEND AID AND SUPPORT TO DEALERS TO DEFEAT PROPOSED ACTION IN BELIEF THAT IT WILL WORK HARM TO BUSINESS

BELIEVING that no motor truck manufacturer can successfully build a business without the dealer as a most important link in the merchandising chain, and that the best thought and ability in motor truck merchandising lines condemns the "direct from factory to user" policy of certain truck manufacturers as impractical, the board of directors of the National Association of Motor Truck Sales Managers in a recent meeting at Detroit, Mich., adopted the following set of resolutions:

Resolved, that, whereas certain procedure has consistently promoted the best interests of manufacturers, dealers and truck users in the furtherance of sales and operation, and,

Whereas, certain sales policies have shown definite and tangible benefits to the motor truck industry as a whole, and,

Whereas, this association has endorsed and is fostering this procedure and these policies, it is

Resolved, that it will not endorse or approve any sales and service plans which take from motor truck dealers the legitimate profits to which they are entitled, realizing that such methods will ultimately be to the detriment of the consumer, inasmuch as it will seriously affect the proper servicing of trucks, and be it further.

Resolved, that it will lend its aid and support to motor truck dealers in their efforts to give truck users prompt and efficient service, which type of service is only possible through direct contact between consumer and dealer in the locality in which such trucks are used, and be it further

Resolved, that it shall use its influence to discourage the "factory to consumer" method of merchandising in the belief that such a plan is impractical for the reason that satisfactory service cannot be rendered and as a consequence the motor truck industry will be injured and the interests of both dealer and consumer will suffer.

N. A. D. A. Approves Policy of Protecting Dealer.

Approval of the above action of the National Association of Motor Truck

OFFICERS OF N. A. M. T. S. M.

President—H. T. Boulden.

Vice President—E. T. Herbig.

Secretary-Treasurer—A. E. Schafer.

General Manager—Don F. Whittaker.

Directors.

H. T. Boulden, E. T. Herbig, A. E. Schafer, A. C. Burch, J. E. Tracy, E. D. Hand, W. A. Clare, J. F. Bowman, Homer Hilton.

Sales Managers aimed at the protection of the dealer was voiced by General Manager Harry G. Moock of the National Automobile Dealers' association in a letter to Hal T. Boulden, vice president of the Selden Truck Corporation and president of the N. A. M. T. S. M. Moock's letter to Boulden follows:

"Fundamentally, the merchandising of automotive products is identical with the merchandising of other lines. The hardware, dry goods, jewelry, furniture and other industries, through years of experience, have learned that as the dealer prospers so does the manufacturer prosper. They know, too, that the dealer is an ineradicable point of contact with the consuming public.

"Because of an unprecedented demand for automotive merchandise a few man-

ufacturers have totally disregarded the experiences of other successful lines and by various means or methods have endeavored to deliver their product to the consumer in a way that has as its principle, the elimination of the dealer profit.

"To those manufacturers that realize that the dealer is a part of their manufacturing institution, and who are constantly trying to improve the dealer method by means of education and direct help, we predict a successful continuation of business.

"There is a type of manufacturer who is trying to carry water on both shoulders; that is, maintain a dealer organization and at the same time sell direct by declaring that selling units in large numbers eliminates any responsibility he may have to the dealer. Such a manufacturer, in our opinion, is holding a nickel so close to his eye that he cannot see a 10-dollar bill an arm's length away and while he may sell today he certainly is not building for the future.

"The recent action taken by your National Association of Motor Truck Sales Managers is indeed commendable. We are certain that dealers representing manufacturers who maintain that the dealer is rightfully entitled to a place in the scheme of merchandising of automobile products, extend to you their heart-felt thanks and appreciation for your action.

"Therefore, we desire you to know, as president of the above named association, that we are indeed gratified that the principle of fair dealing and honesty of purpose with the dealer organization is well founded and established."

ENGLISH CITY TO HAVE DEPOT FOR SIGHT-SEEING CARS.

The increased popularity of road passenger transport is clearly indicated by steps being taken by Blackpool, a Lancashire, England, watering place on the Irish sea, to cope with this traffic during the coming season. Owing to the congestion of the streets during the summer it has been found necessary to withdraw (with a few exceptions) the privilege hitherto granted of allowing char-a-bancs,

or sight-seeing busses, to stand in the streets. To meet the demands of motor vehicles carrying passengers for hire, the city proposes to utilize certain land, belonging to it as a depot, and for this purpose to erect a station with waiting and baggage rooms and an open space for parking char-a-bancs. The proposal is intended as a temporary measure only, the result of which will be awaited before the city embarks on any large expenditure. If the number of char-a-bancs using the municipal depot during the coming

year is substantial, it is anticipated that the city will provide a permanent station for their accommodation.

The competition which developed last year between motor busses and the railways in certain classes of interurban passenger travel is likely to be intensified this year, especially to the summer resorts of North Wales and to the lake district. Throughout the country from Easter to October numerous inland centers were linked up with coast and other summer resorts by motor busses.

CANNOT SUCCESSFULLY SELL TRUCKS BY MAIL

NEW ENGLAND DISTRIBUTORS INTERVIEWED BY MOTOR TRUCK'S
SERVICE MAN UNANIMOUSLY DISAPPROVE OF PLAN PROPOSED BY
CERTAIN MANUFACTURERS—BRAND IT AS IMPRACTICAL—DO NOT
BELIEVE IT WILL BE GENERALLY FAVORED

BABY carriages, flutes, jelly strainers, rubber boots, green neckties and sweet lavender—all of these commodities and a thousand others may be sold successfully by mail and there are a great number of men who have grown rich through this method of merchandising. It is perfectly logical to market these goods by mail. But you never heard of a dentist selling false teeth by mail. The nature of the transaction makes it impossible for the dentist to do business in this manner, though he would have an easy time of it in comparison with the manufacturer who tries to sell motor trucks by the mail order route, according to the general consensus of dealer opinion on the subject.

This publication is not commenting in an editorial capacity on the proposed plan of several truck manufacturers to do a mail order business. Rather, it is handling the question in a reportorial way, the following being a straight forward, unbiased report of the calls of one of MOTOR TRUCK'S service men on seven of the largest truck distributors in New England.

This man merely asked the question, "What do you as a distributor think of the plan proposed by certain manufacturers to sell automobile trucks by mail?" and then listened to what the distributor has had to say, after which he wrote out the man's answer and submitted it to him for his O. K.

DEALER NO. ONE SAID: "My people haven't yet informed me as to whether they intend to market their trucks in that manner or not. My idea of the thing is just this—if the dealer who handles the truck does not take at least a reasonable part of his quota, the factory should be perfectly justified in stepping in and selling their trucks in his territory if possible, provided they do not carry the scheme to the extent that it is put into operation in territories where the dealer is making a fair amount of sales. Personally I do not believe that any manufacturer will disrupt a dealer's business unless that dealer fails to show results."

DEALER NO. TWO SAID: "My opinion is not worth much because I haven't given the matter any thought. I've been too busy selling trucks. There is no doubt that the principle of the thing can be worked out all right in a way that will protect the dealer. Incidentally, if I were a manufacturer and had some of the dealers that are operating in this territory on my staff, I wouldn't feel that I had a fair outlet for my machines, and would start selling them in any manner possible."

DEALER NO. THREE SAID: "The plan of selling trucks by mail will never work. There has never been a truck made that didn't need the service station cooperation at some time or other, and believe me, a mail order truck would re-

ceive poor treatment in the average service station."

DEALER NO. FOUR SAID: "If I were a truck owner I would never purchase a mail order truck. I would feel that the company that adopted any such measure to sell trucks was on its last legs. It looks like a plan that will result in a large number of orphans, but I might be wrong."

DEALER NO. FIVE SAID: "There are some trucks that wouldn't sell by mail or otherwise, now that buying conditions have changed. I am willing to believe that the truck manufacturer who resorts to mail order selling is in this class. How do they plan to give service?"

DEALER NO. SIX SAID: "I understand that there are some truck manufacturers who have planned to sell by mail, but have also made arrangements to have salesmen out to help the dealer, the idea being that the dealer will get his commission as usual. This I think will be a good scheme as it will help both dealer and manufacturer. In effect it will be a drive to stimulate the market, and no one will lose out. Of course the straight mail order business is not applicable to the motor truck for the reason that a motor truck is worthless without a service station, and for this reason I hardly believe that the manufacturer will be so short-sighted as to utterly ignore the dealer."

DEALER NO. SEVEN SAID: "I have been in the truck selling end of it for several years. I know, as well as I know anything, that motor trucks can never be successfully sold by mail. The service element enters into the sales of the truck more than the actual salesman himself does. Imagine a mail order owner coming in to my place of business and asking me for a spare part to fit his mail order truck. He'd stand a fine chance of getting it. 'Why won't you sell it to me?' he'd ask."

"'Where'd you buy your truck?' I'd come back at him."

"'Through the mail,' says he."

"'Go back and buy your spare part through the mail,' I'd say."

"'Who'll repair the truck after I get the part?' he'll ask."

"'Might try the mail man,' that's what I'll tell him."

"Yes, sir, you can tell the readers of MOTOR TRUCK that my opinion is the result of 23 years in the carriage and motor truck business and I haven't the least idea that they'll ever sell many motor trucks by mail. I guess no one is giving any real serious attention to that sort of a selling idea. If they are it's because they have a high inventory they want to work off. I'd be almost willing to bet that you won't hear anything about mail order trucks inside of another six months."

CALDWELL & SON CO. JOINS LINK-BELT.

Charles Piez, president of the Link-Belt Co., 910 South Michigan avenue, Chicago, Ill., announces that the Link-Belt Co. has acquired all the capital stock of the H. W. Caldwell & Son Co., and that Frank C. Caldwell has been elected a director in the Link-Belt Co.

Two experienced and successful companies in the conveyor world have thus joined forces, with the result that the Link-Belt Co. has added two new lines, Helicoid conveyors and power transmission machinery, to its line of manufactures.

While the H. W. Caldwell & Son Co.'s plant will continue to operate under separate corporate existence and under its

present name, the joint facilities of the two companies, and the broader avenues of distribution of the Link-Belt Co. ought to prove of distinct advantage to the customers of both.

There will be no modifications of the policies of the Caldwell plant, no impairment of its service to its customers, no change in the diversity or character of its product.

Big Item in Foreign Trade

**MOTOR CARS HEAD LIST OF MANUFACTURED PRODUCTS—
WOULD BENEFIT BY LOWER AUTOMOBILE DUTY PROPOSED
BY NEW TARIFF BILL, SAYS J. WALTER DRAKE, CHAIRMAN
FOREIGN TRADE, NATIONAL CHAMBER OF COMMERCE**

THE lower automobile duty in the proposed new tariff bill will aid American foreign trade, even though the act itself may need revision in the way of excessive duties on raw materials, is the opinion of J. Walter Drake, chairman of the foreign trade committee of the National Automobile Chamber of Commerce, who points out that exports of motor vehicles and parts in 1920 headed the list of manufactured articles with a valuation of \$298,219,875, and were exceeded only by raw cotton, wheat and coal.

"With present unsettled conditions in the exchanges, it is difficult to decide on a dutiable basis which will be most equitable to all nations. Under the American valuation system, an attempt was made in that direction. Its disadvantage, unfortunately, lies in the ease with which duties may be increased arbitrarily. United States manufacturers, by enhancing the price of their goods, could establish a higher American valuation basis and consequently bring about the collection of a larger amount in duty," says Mr. Drake.

"The underlying object in proposing the American valuation was probably to approximate the C. I. F. value, which is used mostly abroad as a dutiable basis, but lends itself automatically to indirect discriminations."

"In Jugoslavia, passenger cars are dutiable at 48 per cent. of the C. I. F. value at the customs house in country of destination. This means, with regards to American cars, that the tax is also assessed on the cumulative charges for boxing, rail freight in the United States, overseas freight, lighterage and interest on the money outlay. An American medium-priced car, because of these charges amounting to about \$400, would be assessed about \$200 more in duty than a car originating in Italy or Central Europe where these special charges would be

practically non-existent. Incidents of this kind where the product of a friendly nation is assessed inequitably because of the dutiable basis, would be impossible under a system of American valuations. It is regrettable that this advantage should be offset by the weak feature referred to above.

cent. respectively, then British or French cars could be assessed as high as 50 per cent. when imported into the United States.

"The European manufacturers expressed some time ago their desire for a uniform automobile duty in the principal manufacturing countries. With the

above United States tariff provision the attainment of that object is possible.

"Immediately after the armistice, arrangements were made between certain countries which worked to the disadvantage of the American exporter of automotive products. Czechoslovakia, for illustration, permits the importation, without special permit, of Italian motor vehicles. On the other hand, imports of these commodities from the United States are effectively obstructed because of the necessity of complying with such a governmental formality. The continuation of such practices,

Instead of waiting for some mysterious set of forces to restore good times, the people of the United States have settled down to the grim and sober business of working out their own salvation, writes Archer Wall Douglas, chairman of the committee on statistics and standards of the Chamber of Commerce of the United States, in his monthly review of business conditions in the August number of *The Nation's Business*.

While the return to better times is certain to be slow, he says, there can be no doubt as to the final recovery.

"The story of the present business depression," says Mr. Douglas, "is very similar to other depressions which have occurred during the past half-century. The beginning of the end of speculation and over-expansion came with the restriction of credit that put a sudden crimp in the volume of business and started prices downward on their long journey of declines. Then followed the slowing down in industry, the incubus of much unemployment, and all the attendant evils of hard times. After the first shock there was a flood of forecasts of an early return to former conditions and the passing of those ills which afflicted the country. Invariably the prophecies came to grief.

"One of the ear marks of past depressions was the fantastic schemes advanced to prevent the return of such eras. These schemes included the stabilization of prices and doing something to the currency so that its purchasing power would always be the same. And there are those among us who take these theories seriously today just as our forbears did in their day. We have at least one consolation in this generation, that out of the welter of past misfortunes we have learned the lesson of a sound financial system as embodied in the Federal Reserve bank."

"The chronicle in industrial life is one of better business in leather, especially in boots and shoes; lower prices in an increasing number of makes of automobiles, and of good business in automobile sundries; lower prices in oil with the likelihood of consequent decreased production; continued dullness in mining; some improvement in clothing; production in steel and iron down to lower levels and with reduced prices, yet with slight increase in sales of some of the finished products; a generally good movement in summer seasonable goods; slow increase in construction as the costs of material and of labor decline in different sections; more particularly in the large cities; better wholesale trade in general, but of smaller volume of retail business in the large centers."

American Makers Asked for Lower Tariff.

"The American manufacturers as a group, applied for a uniform duty of 30 per cent. on imported automobiles as against the prevailing rate of 45 per cent. This united request is practically accorded by the House Ways and Means committee in recommending the duty of 25 per cent. on American valuation, which would be the equivalent of about 30 per cent. if the dutiable basis in the Underwood act were employed.

Uniform Automobile Duty Possible.

"A most commendable feature is the provision making the reduced rate applicable to motor products from such countries only as similarly favor American exporters. Thus the British and French cars will be dutiable at 25 per cent. in the event only that American motor vehicles are subject to an identical duty when exported to either of those two countries. If, however, the rate is maintained as now at 33 1/3 or 45 per

however, may be expected to cease as President Harding, under the Fordney tariff, will be authorized to assess additional duties on products of any kind from countries discriminating against American trade.

Affords Benefits of Reciprocity Treaties.

"The advantages accruing to both countries are fully realized in the commercial treaty existing between Cuba and the United States. The benefit to commerce is the direct result of the mutual tariff concessions on commodities moving between the two countries. The number of reciprocity treaties, with their accompanying benefits, may be expected to increase, as President Harding can start negotiations at once with other countries by offering tariff concessions up to 20 per cent. on foreign goods imported into the United States. Immediate governmental action in this manner should prove most helpful in extending American foreign trade.

Federal 5-Ton Truck Displaces Former Model

Demonstrations Prove This New Model, Equipped with 50-Horsepower Continental Engine, Has Unlimited Power and Staying Qualities, Pulling Out of Difficult Places and Hauling Loads Under Adverse Conditions

A NUMBER of new and distinctive features are stated to be possessed by the new five-six ton model truck announced recently by the Federal Motor Truck Co., Detroit, Mich.

This new heavy model, which has been placed in production after many months of experimental and actual road test work, was developed for the express purpose of meeting several demands of heavy haulage service which have developed during the past few years. One is a continually increasing call for a truck with sufficient power to pull itself out of practically any of the difficult places, excavations, pits, bad roads, etc., in which heavy trucks must operate, with its full capacity load; and another is for a greater road speed under full load than has been possible heretofore with the average fully loaded heavy-duty truck.

Among the features of this new model is the new 50-horsepower, Continental engine, which was constructed especially for this model of truck and in accordance with the designs and specifications of Federal engineers. By means of this engine the truck is able to attain an unusual speed on the road, and the manufacturer claims for it that in all of the operating tests the truck has never been placed in a position where the drive wheels could not be spun so powerful is the engine.

A number of unusual refinements have also been added. The license plate, for instance, is fastened by a special patented fixture, directly on the inside of the rear frame member, so that the tail light, which is located within the frame, may shine directly on the license plate and still be protected by the frame from shocks from the rear. The red lamp shines through a special hole in the rear frame.

A hubodometer, attached to the left front wheel hub so as to protect it from injury from curbs, etc., is furnished as standard equipment. Electric generator, battery, lights and horn are also supplied as standard equipment, while a vacuum feed system supplies the fuel to the engine.

Quantity production of the new model truck is already well under way, and the Federal Motor Truck Co. will be in a position to meet the demand for this new model by early summer.

The specifications of this new model contain a large number of features that differ from those of the former five-ton model, and a number of them are distinct innovations in this type of heavy-duty truck.

Unusually Heavy Power Developed by Engine.

The engine in general has been designed and constructed to withstand the severe abuse to which a truck engine is usually subjected and is very sturdy. It is a four-cylinder, four-cycle, vertical, I-head type, having a bore of $4\frac{3}{4}$ inches and stroke of six inches. At 1100 revolutions the engine is capable of developing 50 actual horsepower, while the S. A. E. rating is given as 36.1 horsepower. The cylinders are cast in pairs from special iron. The cylinder heads are removable and, as well as the valve chambers, are well water jacketed.

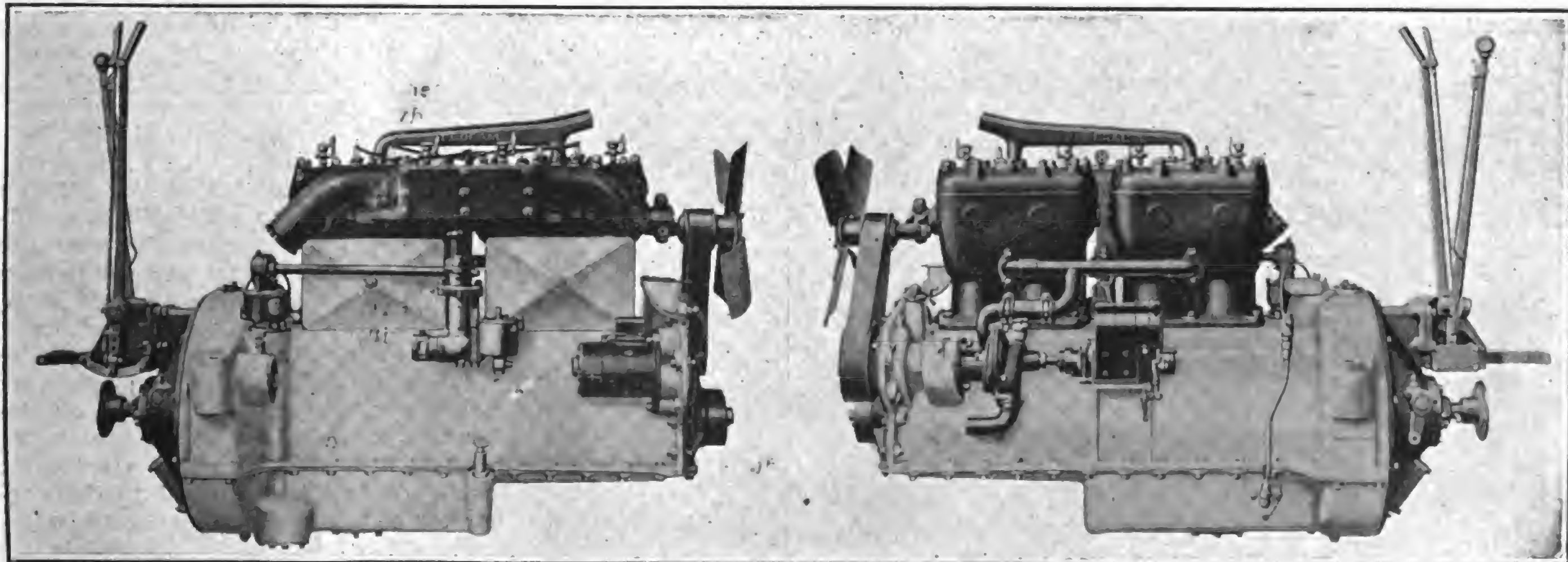
The crank case is constructed of aluminum and divided into an upper section and a lower section designated as the oil pan. The forward part of the upper section forms the timing gear set case, together with a cover which is bolted to the upper section with steel alloy cap bolts. A rear extension, cast integral with the crank case, forms the standard S. A. E. bell housing of the fly wheel,

which is fitted with arms cast integral with the housing, which form the rear engine supports and provide a means of bolting the engine to the truck frame. An opening is provided in the top of the bell housing through which the timing marks on the fly wheel are easily observed when setting the engine valves.

The oil pan or lower section is shallow at the forward end and quite deep at the rear, forming the oil sump or reservoir in which the engine lubricating oil is contained. The pan is provided with a rear extension which fits under the fly wheel housing and is bolted to it with steel alloy bolts. The pan is also bolted to the upper section for its full length with steel bolts, while a packing, placed between the sections, prevents oil from the crank case seeping through and being wasted.

Provision is also made, when casting the upper section of the fly wheel bell housing, to install a starting motor if the manufacturer desires; also in the forward extension for installing an electric generator, which is driven from the timing gear set.

Provision is made in the timing gear set cover to allow oil, poured in through a filling spout attached to the forward extension of the upper section of the crank case, to flow over the timing gears before it passes into the crank case. A trunnion support is formed on the cover when the cover is cast, which acts as the forward support for the engine, which in turn is supported by a cross arm to the truck frame, the cross arm being bolted with steel bolts to the side members. The two pairs of cylinders are bolted to the upper section of the crank case with steel alloy stud bolts, which insures an unusually rigid construction. The upper section of the crank case is heavily



Fifty-Horsepower Continental Engine Which Powers New Federal Five-Ton Model Truck, Showing Right and Left Sides.

webbed inside for the support of the large crank shaft journal bearings.

Crank Shaft a Three-Journal Type.

The crank shaft is a large three-journal type, 2½ inches in diameter, perfectly balanced before assembling on a balancing machine designed especially for this purpose. The crank shaft thrust is taken on the front bearing, which allows for unequal expansion between the crank shaft and crank case and also enables the adjustment for end play to be provided.

Reciprocating Parts Accurately Balanced.

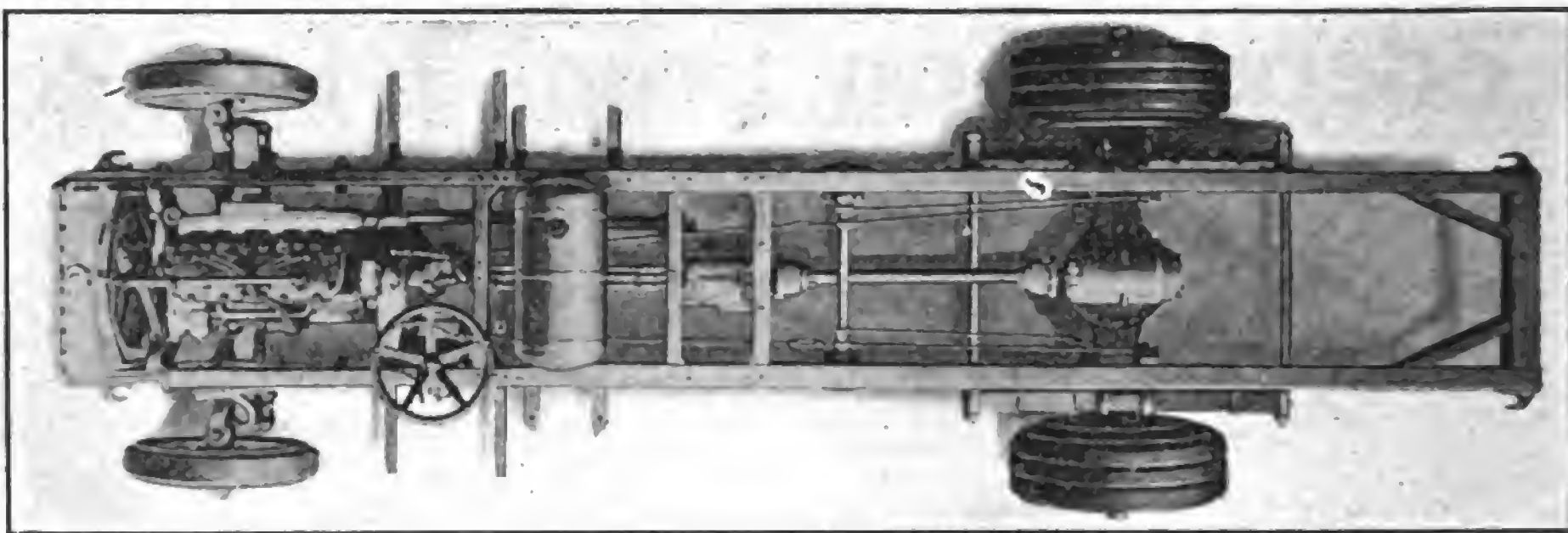
All reciprocating parts of the new engine are accurately balanced before assembling to prevent vibration stresses from affecting the operation of the finished engine. A perfect balance is assured to the entire engine which tends to eliminate troubles and defects which are sure to follow excessive vibration of the parts. The pistons and connecting rods are of extra length to reduce side thrust, and designed to give the engine maximum length of life with the minimum amount of attention. Each piston is equipped with ¼-inch piston rings.

The cam shaft operates on three bearings, and is 1¼ inches in diameter between the cams and is machined and finished on special machines which grind the cam shaft and cams unusually accurate. The diameter of the cam shaft at the bearings is greater than the height of the cams, permitting the removal of the shaft, in case of necessity, without disturbing the bearings.

The gear train at the front of the engine consists of four gears instead of the conventional three. The use of an idler gear between the cam and the pump gears and the crank shaft gears makes it possible to distribute the location of the accessories, such as the water pump, generator, magneto, etc., that they may be easily installed and accessible for adjustment.

The valves are located on the right hand side of the engine and are 2 1/32 inches in diameter "in the clear" and the valve stem diameter is 7/16 of an inch.

The valve mechanism is completely enclosed by side plates, held securely by a nut and bolt fastening; prevents leakage of oil, silences the operation of the push rods and tappets. The piston rings are located in the piston by a specially designed lock, there being no threads in the piston which can strip. Both the lock and the screw are of alloy steel.



Air-Plane View of Federal Five-Ton Chassis.

Manifolds of Unique Design.

The exhaust and intake manifolds follow conventional practise in their construction, being cast separate, but differ from the conventional form by being joined with a large plate which transmits more or less of the heat of the exhaust manifold to the intake manifold, where it is utilized by the incoming gas, heating the gas and vaporizing it quickly by raising the temperature before it reaches the combustion chambers of the engine. This type of construction makes possible the developing of full power with a minimum of fuel consumption. The intake heater is adjustable so that the fuel taken into the combustion chambers can be raised to a higher temperature in winter than is necessary for summer driving.

Lubrication of the Engine.

The new engine is provided with a full-pressure feed oiling system of the geared pump, force-feed type. The pump is driven by spiral gears from the cam shaft, thrust on the pump shaft being taken by suitable shoulders against a bronze bushing carried in the crank case.

The oil pump is primed automatically and draws oil through a liberally proportioned strainer in the oil pan. From this pump oil leads run to all the main bearings and the timing gear set. The crank shaft is drilled to supply oil to the connecting rod bearings and a special oil duct carries the oil from the lower end of the connecting rod to the piston pin bearings at the small end.

An oil pressure adjusting valve is built into the engine, and the oil level in the oil reservoir is determined by the use of the conventional bayonet or stick type of gauge. A pressure gauge located on the dash of the truck indicates the pressure under which the oil is circulating. The oil that feeds the pump is strained by a non-clogging, newly designed strain-

er, which is carried in the oil reservoir and which prevents the possibility of obstructing the flow of oil. An oil sump, cast in the lowest part of the oil reservoir, is fitted with a removable cover, which makes the draining of old or dirty oil from the engine an easy operation.

Cooling System.

A centrifugal water pump of the latest design insures ample cooling facilities under the most trying conditions. An impeller is used which gives high cooling efficiency. Ample room is provided for the take-up and replacement of worn-out packing. The water passages are large and the water jackets and cylinder heads are of such generous design as to give ample cooling space where this is most needed.

Engine Equipment.

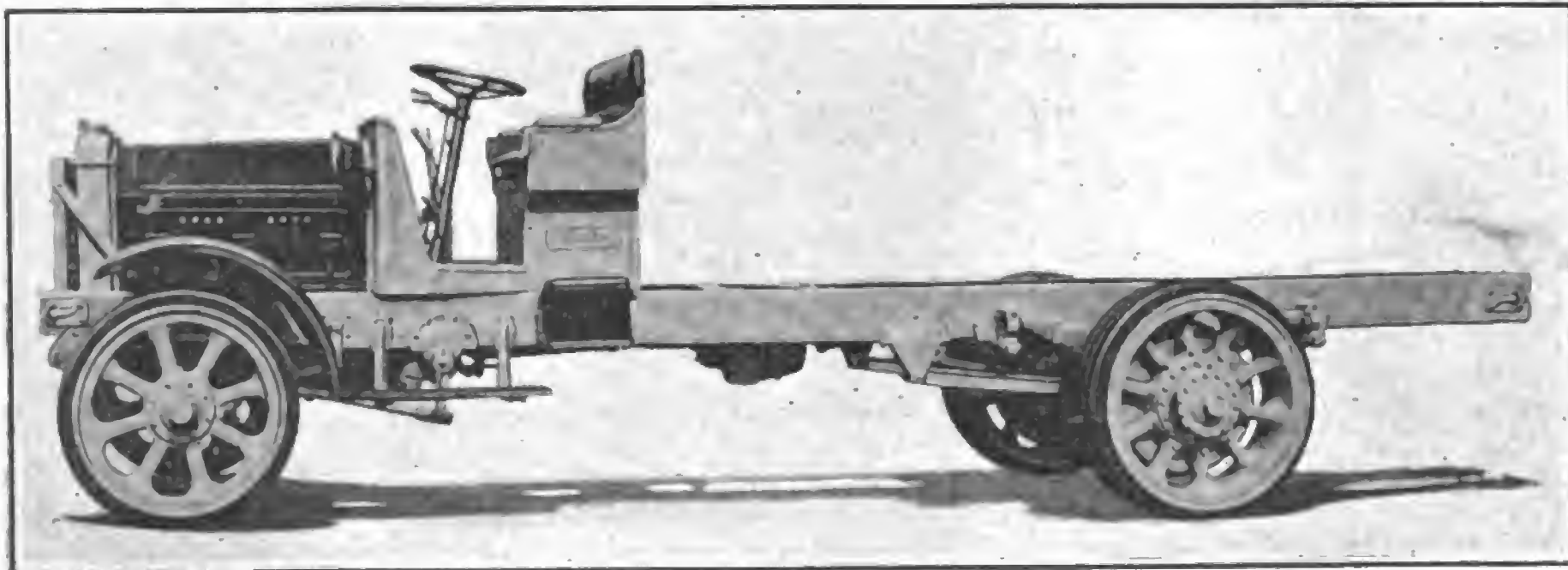
A centrifugal type governor, connected to the intake manifold, operates in an exceedingly simple and direct manner. The inertia medium is oil, the action of which raises and lowers a piston, which in turn opens and closes a butterfly valve in the intake pipe.

Ignition is furnished by an Eisemann high-tension, G4 magneto, which is mounted on a bracket cast integral with the crank case and driven by the pump shaft. A patented impulse starter is a feature of this magneto and the starter enables the magneto to deliver a spark when the engine is cranked slowly by hand, which is as hot as when the engine is operating at full speed.

The electrical equipment of this new truck consists of an electric generator, six-volt storage battery, two electric side lamps fitted with diffusing lenses that are legal in all states, an electric tail lamp and electric horn, operated by the battery through a button located on top of the steering wheel post.

The gasoline tank is of pressed steel, made in two sections, welded electrically and tinned so that it is rust-proof. The tank is located under the driver's seat, resting in two malleable iron saddles, secured by straps passing over the top of the tank and fastened to the saddles. The tank is equipped with a large sized filler cap located on top, and has a sediment cup at the gasoline outlet. The gasoline is fed to the carburetor by means of a vacuum tank located on the front of the dash and under the engine hood. Through this system a sufficient supply of fuel is furnished to the carburetor at all times and under all conditions.

The carburetor is a 1½-inch Zenith, model L-6, of the same design as that



Rugged Construction and Clean-Cut Lines Feature New Five-Ton Federal.

used by the Federal Co. on all other models.

Clutch and Transmission Gear Set.

The type of clutch used on this new Federal truck is of single, dry-plate construction and is similar in design to the clutches used on all models of Federal trucks. The clutch is of unusual strength and size for this capacity of truck, and the driving discs are 14 inches in diameter. The clutch shaft is $1\frac{3}{4}$ inches in diameter and is milled with 10 splines, giving the extra strength required to transmit the great power developed by the engine. The throw-out thrust is taken up by special ball thrust bearings designed expressly for this purpose.

The clutch shaft is mounted on two ball bearings, and the lubrication of these bearings and the throw-out sleeve is amply provided for by a drilled clutch shaft through which grease is forced.

The transmission gear set is of the selective change speed type, having four speeds forward and one reverse. The transmission gear ratios are as follows:

Fourth speed or high drive, 1 to 1; third speed, 1.75 to 1; second speed, 3.22 to 1; first speed, 5.85 to 1; reverse, 6.8 to 1.

The transmission case is mounted amidship and is suspended on three points, two at the rear and one in front. The front support is flexible, while the two rear supports are bolted rigidly to frame side members. This three-point suspension transmission, as in the engine, relieves stresses and prevents any frame distortion strains from reaching this unit. The transmission case is of very rugged construction and is reinforced by specially designed webbing and extra heavy walls.

The transmission gears are drop-forged of chrome-nickel steel, heat-treated, hardened and ground. An opening on the side of the transmission case is provided, through which, by removing a plug, the gear set may be filled with lubricant, which is a distinctive Federal feature.

A power take-off for use in coupling up a hoist, winch, or other mechanical

auxiliary, may be readily attached to the gear set by the removal of cover plates on either side of the case.

The use of an amidship transmission gear set necessitates two propeller shafts, one between the clutch and transmission, and the second between the gear set and rear axle. Each of these carries two universal joints of ample strength, free acting and enclosed in a pressed steel housing for the retention of the lubricant and to exclude dirt and grit. The shafts are tubular, fitted with forged stubs electrically welded at each end, to which the universal joints are attached. Special attention has been given to these tubular shafts in order to secure a diameter amply large enough to avoid any possibility of whipping. The general construction is such as to secure the flexibility necessary to meet the conditions of service.

Chassis Components.

The frame is of pressed steel channel section, nine inches deep by $\frac{9}{32}$ of an inch thick, reinforced at all corners, and at the junction of the frame cross members with heavy gusset plates. The frame is hot rivetted and all rivet holes are drilled and not punched.

The five-six ton truck is made in the following three chassis lengths:

	Wheelbase	Space	Overall	Length
Dump...	163 in.	130 in.	222 in.	11/16 in.
Standard	163 in.	154 in.	246 in.	11/16 in.
	163 in.	190 in.	282 in.	11/16 in.

Steering gear is of the Gemmer irreversible type of worm and worm wheel construction, the worm being made of hardened steel, integral with the shaft, while the worm is keyed to the steering column tube. The mounting of the steering gear column is of exceptional heavy design and rugged construction throughout.

The spark and throttle levers are mounted on the steering post in an accessible position, while a foot accelerator is provided on the toe board. The steering gear, clutch pedal and service brake pedal are on the left side of the

driver, while the gear shift lever and emergency brake lever are mounted in the conventional position in the center.

The rod connecting the steering gear with the front axle spindle ball arm is made of seamless steel tubing, and both the front and rear ends are equipped with a spring construction, which absorbs and keeps road shocks from being transmitted to the steering wheel.

The front axle is the well-known Timken, drop-forged type, heat-treated, I-beam section, and is provided with Timken roller bearings throughout. Dropping the rear eye of the front spring slightly lower than the front eye, a caster effect is obtained whereby unusual ease of steering is accomplished, as well as a tendency of the front wheels to follow the road without guiding.

The radiator construction was originated by the Federal Co. several years ago, and is especially adapted for truck service. The core is supported between two (upper and lower) tanks. The tank side walls that enclose the core are of pressed steel, which has been put through a rust-proofing process.

The radiator cores may be removed by simply unbolting the upper and lower tanks, making the replacing or repairing of cores a simple and speedy job in case of necessity. The filler cap is so large that it is unnecessary to use a funnel to fill the radiator.

The surface exposed to radiation is more than ample to secure sufficient cooling in the warmest climate during any season. The radiator is carried on rubber pads on the front cross members of the frame, and the two studs that fasten it to the frame have springs interposed between the frame cross member and nuts on the studs, which take up the strain which might be transmitted to the radiator in case of frame distortion. A shroud is built on the back of the radiator, which completely encloses the fan, greatly increasing the cooling capacity of the radiator. A very substantial radiator guard is mounted in front of the radiator, braced securely to the frame members and protecting the radiator in case of accidents.

Towing or pintle hooks are securely fastened at each corner of the truck frame. These hooks are drop-forged from carbon steel and heat-treated to relieve internal strains or stresses due to forging. The nose or point of the hook is turned up to prevent the rope or chain from accidental disengagement.

A four-bladed fan, the product of 11 years' experience, embodying features essential to efficient cooling, deserves special note as a feature of this truck. It combines maximum cooling with superior heavy construction.

Rear Axle Construction.

The Federal rear axle is of the Timken full-floating type, equipped with a Timken-David Brown worm gearing. The worm drive is used exclusively in Federal trucks as it is considered the logical drive for heavy-duty service, such as Federal trucks encounter in their regular lines of service. The statement is made that out of 100 per cent. of truck



Federal Truck, Equipped with Giant Cord Pneumatics, Proves Money-Maker for Oklahoma City Woman Hauling Sand for Retail Delivery.

manufacturers, 64½ per cent. use worm drive, the balance, 35½ per cent., being divided between users of internal gear, chain, bevel and double reduction, the last representing 1 3/10 per cent. of the whole.

The worm drive lends itself to advantageous features in manufacture. The mechanism of the worm and wheel may be enclosed in a housing that is leak-proof. At the same time it provides a housing for the worm that is free from dirt and grit. The worm always runs in

a bath of oil and, as none of the load carrying strains of the truck are transmitted to the worm, therefore, the alignment of the worm and wheel is unaffected and efficiency, silence, long life and interrupted service are the result.

The ratio of the worm wheel in the rear axle of the five to six-ton trucks is 10¼ to one.

The standard tire equipment includes 36 by six-inch front and 40 by six-inch duals rear, or 40 by 12-inch Giant tires may be furnished at extra cost.

Steel wheels are supplied as regular equipment. They are made of a special alloy malleable iron, having the spokes and felloes cast hollow to reduce the weight, but are webbed internally to gain strength to withstand unusual stresses. A hubodometer is furnished as standard equipment and is attached to the left front wheel hub to prevent the possibility of injury through contact with curbing or loading platforms.

The tread of the rear wheels is 69½ inches and of the front wheels 66½.

SECRET OF SILENCE AND DURABILITY.

What is the secret of the silence and durability of the gears used in Pierce-Arrow cars and trucks?

This question frequently is asked, according to a Pierce-Arrow representative, and there are two answers. One, he said, is the use of steel of a quality specified for armor-piercing projectiles. The other is the application of testing on a commercial scale, a rarity in the automotive industry.

"The quality of Pierce-Arrow gears is safeguarded by tests and inspections from the moment the raw billets are received until the completed gears are assembled into the cars or trucks," said the representative.

"Throughout the many machining operations and the heat-treating and case-hardening processes, inspections and tests determine the quality and accuracy of every gear.

"These inspections and tests are applied to each gear—not to occasional ones. Each set of gears is meshed on a testing apparatus which records variations of less than five-thousandths of an inch. Each gear is subjected to Brinnell and scleroscope tests.

"The Brinnell machine forces a steel ball under a pressure of three tons into

the surface of the gear. This depression is measured under a microscope and the degree of toughness thereby determined. The scleroscope, it is explained, drops a diamond-pointed weight on to the gear, the rebound being measured on a graduated scale. Thus the hardness and other qualities of the metal are ascertained."

AMERICAN FORGING & SOCKET CO. AGAIN IN PRODUCTION.

The American Forging & Socket Co., Pontiac, Mich., reports that after several months of idleness, it is again in operation and is experiencing a steadily increasing demand for its products. At present the operations are stated to be about 60 per cent. of normal. This company is featuring prominently its one-man top outfit for Fords and also windshield top supports for Ford touring cars. These products are being marketed under the trade name "Pontiac," it being the intention to add from time to time further useful products to the Pontiac line.

TERMS USED IN HIGHWAY ENGINEERING.

In connection with the discussion of good roads which is so prominently before the public at the present time, it is

stated that there has been some inaccuracy in the nomenclature of the various materials used in road construction. The following glossary of terms has been prepared to obviate error and confusion and is endorsed by highway engineers:

Asphalt—Solid or semi-solid native bitumens, solid or semi-solid bitumens obtained by refining petroleum, or solid or semi-solid bitumens which are combinations of the bitumens mentioned with petroleum or derivatives thereof, which melt on the application of heat, and which consist of a mixture of hydrocarbons and their derivations of complex structure, largely cyclic and bridge compounds.

Bitumen—A mixture of native or pyrogenous hydrocarbons and their non-metallic derivatives, which may be gases, liquids, viscous liquids or solids, and which are soluble in carbon disulphide.

Bituminous Material—Material containing bitumen as an essential constituent.

Refined Tar—A tar freed from water by evaporation or distillation, which is continued until the residue is of the desired consistency, or a product produced by fluxing tar residuum with tar distillation.

Tar—Bitumen which yields pitch upon fractional distillation and which is produced as a distillate by the destructive distillation of bitumens, pyro-bitumens or organic material.

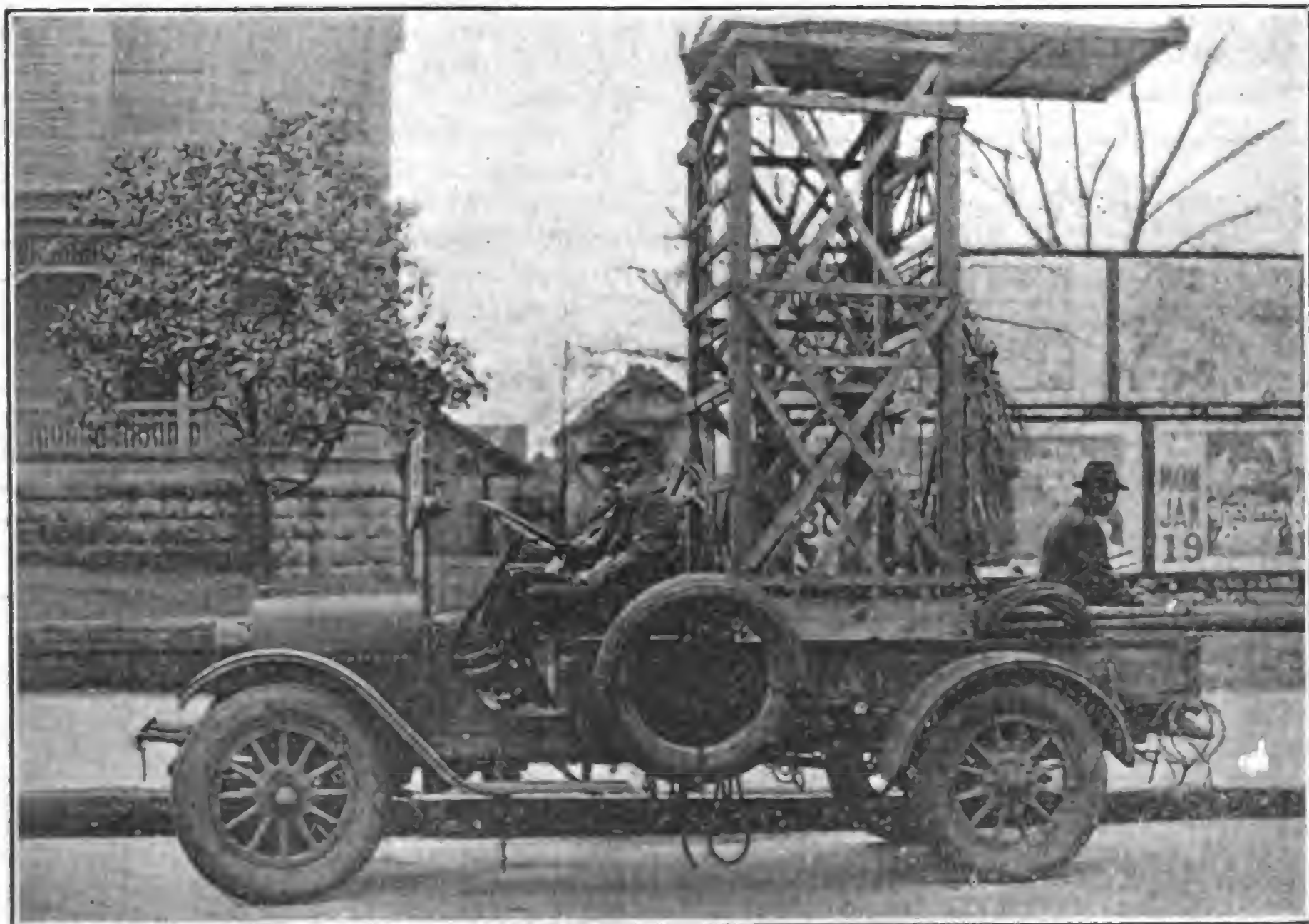
CONNECTICUT CO. CHARGES INFRINGEMENT OF PATENTS.

It is stated that the Connecticut Telephone & Electric Co., New York City, has brought suit against the Packard Ignition & Electric Co., also of that city, charging infringement of patents and unfair practise. The patents involved are No. 1,029,914, No. 1,113,850 and No. 1,204,104, covering igniter and distributor mechanisms.

Several suits along the same line have previously been brought by the Connecticut Co. against other manufacturers and distributors who have made and sold breaker devices in imitation of the genuine Connecticut product. The attitude of the Connecticut Co. against the imitation substitute part is that the car user suffers from imperfect devices and that the reputation of the Connecticut system unjustly suffers.

VICTORY TRACTOR IN HANDS OF RECEIVER.

It is reported that the Victory Tractor Co., Greensburg, Ind., has been placed in the hands of a receiver upon an action brought by the Electric Steel Co. of Indiana. Hugh Wickens and Thomas E. Davidson, Greensburg, were appointed receivers.



Oldsmobile Economy Truck, Equipped for Overhead Wire Repairing, Owned by Street Railway Co. of Jackson, Miss.

Here's Another Chapter of an Old Story

DEALER MUST GIVE TO GET.

The thinking business man realizes that he can only GET by GIVING. It is only through a successful business relation with the customer that he can hope to get that customer's future business. This means that he must SPEND if he would EARN. This is trite enough—bromidic if you wish; certainly it has all the elements of platitude. Nevertheless it is TRUE, and because of this will bear repeating.

Service is service only as it serves. That's another platitude, but its resources haven't yet been exhausted. Think it over—see if you can't get a broader vision of what it means to your business. And remember this: Truck service isn't founded on gratuities. There's a deeper significance to it than that.

RIGHT at the start of this article let us agree to forget that there has ever been any agitation over "free service" as applied to selling and owning motor trucks—except as the term may refer to "inspection, advice and air." Otherwise it doesn't exist, and the aforementioned aren't "free" in the real sense of the word, being merely applied salesmanship that keeps the customer good-natured and holds his replacement business. All service is salesmanship, and for this reason there is, fundamentally, no such thing as a sales department and a service department, the one separate from the other. They are best spoken of as one combined department because they work together at all times—that is, they do if they are functioning properly.

The truck owner is a business man. He knows that he cannot afford to give something for nothing, and fully realizes that no one else can do it. He isn't interested in getting anything free. The question that he wants answered satisfactorily is, "Can you as a dealer, promise me 24-hour service that will keep my truck on the road?"

This is the crux of the service problem as it relates to the motor truck. The "free" phase of it doesn't enter into the matter at all. The owner expects to pay for the work he has done—he merely wants to be assured that you can give him prompt service. The majority of all dissatisfaction expressed by the owner today is due to the failure of the dealer to give proper service—service that will enable the owner to get his truck out of the repair shop in the least possible time.

Every truck that was ever built will eventually need service of some sort or other. Usually this service—because the truck is used by its owner in making money—will be of an emergency nature, and the dealer who fully realizes his indebtedness to the owner is going to get that owner's future replacement business by being fully equipped to handle any and all service problems.

It isn't always the dealer handling the expensive make of truck who gives the best service. The writer had this called to his attention in a very striking manner while in conversation with a contractor on a recent trip through New York state. This man has one of the best conducted general trucking businesses in the East. It is not as large as many, but it could well serve as a model for some that are a great deal larger. It

is efficiently run in a business-like manner, and because of this was made the subject of a magazine article about two years ago.

At that time this contractor was using the "ABC" trucks. He had 14 of them, ranging from the two-ton size to the five-ton size, and if memory serves he also had a special seven-ton job manufactured by the same company. On the occasion of the writer's recent visit he was using only two of the former machines, the rest having been replaced with another, less expensive, make.

After a few remarks relative to business in general and the trucking business in particular had been passed, the writer asked: "Didn't you have a fleet of 'ABC's' when I was here last?"

"Yes," nodded the contractor. "I had 'em sure enough, but I wouldn't have another one though. Getting rid of the last two just as soon as some one comes through with a reasonable offer. Sold all the rest and replaced them with 'XYZ's'."

The editorial man employed on a trade publication may not publicly air his opinions. Therefore, I kept my own council as to what I thought of his judgment, for there was absolutely no question but that the "ABC's" were by far the better trucks.

They should have been—they cost twice as much as the ones he now owned. I suppose my expression of surprise conveyed my unasked question, for he answered, before I could speak.

"Yes, I know the first trucks I owned were considerably the better of the two makes. No question about it in my mind. In fact I think they're still the best trucks made just as I did two years ago, but I had to make a change," he fin-

ished, absently thumbing the edge of a paper cutter.

"Why?" I asked, somewhat puzzled. "That sounds interesting. If it isn't a 'state secret' I'd like to know the story."

No Fiction in Check Book.

"Isn't much of a story," he laughed ruefully. "At any rate it isn't a fiction story because I wrote it in my check book, and one doesn't write fiction stories in a check book. Cold, hard facts, I call them," settling more comfortably in his office chair.

"To make a long story as short as possible. I quit using the 'ABC' trucks because I couldn't get service on them. I don't care how good a truck is, there comes a time when it has to go up for repairs. Regardless of whether it is the manufacturer's or the driver's fault, the truck simply won't last forever. And when they need fixing, they've got to have it at once. Otherwise they lose valuable time and time means nothing less than hard cash money to a man in business," he finished, filling his pipe from a convenient can of tobacco.

I nodded assent.

"Well," he went on, after lighting his pipe, "the dealer who handles the 'ABC' truck in this district doesn't have much idea of what service means. He's keen on selling though, and I didn't hesitate at giving him my order for six trucks when I started replacing my horse-drawn vehicles. He promised service of all kinds—said he would be equipped to handle anything that needed to be done, and within six months after I started using the trucks had sold me eight more, making 14 in all.

"He was always buzzing around my

ears for business and seemed to regard me in a pretty favorable light, which wasn't strange since I was about the only fleet customer he had. Well, every-

station this man had down to his agency. "I jumped aboard my automobile and went down there and I found out what was the trouble all right. That dealer

and a good reason why I changed dealers, too, isn't it?"

I had to admit that it was.

Kind of Service the Owner Expects.

The foregoing is an example of what the truck owner expects of the service station. The question of money doesn't enter into the matter at all. The time element is what counts, and it is unusual to find an owner who finds fault with the bill, provided that it is legitimate.

The dealer who succeeds in a big way does so because he places service ahead of sales. Such a dealer is an idealist in a common-sense way. He is not in business wholly with the idea of making money. His main idea is to keep his clients satisfied. Thus he places service ahead of sales, because, though the two are fundamentally the same thing, they operate in somewhat different ways.

For instance, while the original sale may be made by verbal salesmanship methods, the future sales to the same customer are based almost wholly on reputation, and reputation of the right sort can only be founded on legitimate service. Thus the system, or cycle, that begins with verbal salesmanship is completed by service selling. Only in this way can a dealer succeed, because only in this way can he get the future sales, and future sales in the truck business form the whole structure of success.

It's pretty nice to have a fleet owner, or an individual, so well satisfied with the way you have used him that he will order extra trucks over the 'phone without the expense of salesmanship, time or trouble. It's just like finding money, and there are a great many dealers who have had this experience time after time.

Secret of Proper Service.

The whole secret of proper truck service may be summed up in one short sentence, viz., **TO GIVE PROMPT SERVICE AT A REASONABLE COST**, and that goes as it lays. There is not the acute need for haste in repairing the passen-

PROFESSION AND POSSESSION.

It is one thing to claim, another to possess. In other words, while it is easy enough for the salesman to tell the customer about the good facilities for service that he can offer, it is quite another matter to be actually in a position as to equipment and stock to give this service when the time comes that it is needed. The short-sighted dealer can carry on his business in a desultory way without giving service—for a little while—but since all truck distribution, to be successful, must be founded on future sales—and all future sales founded on service—the connection is obvious and needs no further delineation. Instead of the **SALES** and **SERVICE** department, it would better be spoken of as the **SERVICE SALES** department. Think that over.

thing went fine with the trucks for a while. He attended to minor repairs, which were all I had for two years or more, in fine shape. Then came a time when I found out that he wasn't dependable. He wasn't there at all, and all of his fine service talk proved to be bunk.

"It was during a rush job of excavating that I got my lesson. I got the bid for all the haulage on the new high school building here in town. This included a cellar six feet deep and about 100 feet square. According to the terms of the contract which, by the way, were about as low as I felt I could stand, I had to have this cellar all done at a certain time, ready for the masons. There was a forfeit clause in the contract that charged me \$100 a day for every day I used over and above a certain number of days to do the work. But you're familiar with that sort of a contract."

I nodded.

"Well, the first misfortune we had was to back into a hole and smash a rear end on one of the five-tonners. That was the first time I had called on this dealer for any real service, using the term in the way that the truck owner understands it. I told the driver to leave the truck at the service station with orders that it be ready in the morning and thought nothing of it, as we're used to accidents in this business.

"I always oversee my bigger jobs personally, and the next morning was looking for the truck. It wasn't there at 7:30 when the whistle blew. So I asked one of the drivers where the other driver had gone and was told that he was after the truck. He didn't show up until after 9 o'clock and then he was driving one of the two-tonners.

"Where's the five-ton?" I asked.

"Not ready," he answered. Well, if you'll believe me, it was a week before I got that truck working again. The same thing happened when the steam shovel crashed into the engine of another five-tonner. No chance to get it fixed until the part came from the city. About this time I was getting red, I guess, and determined to see what sort of a 'service'

hadn't lied to me when he got my trade through promising service, because he had 'parts' sure enough. Strictly speaking, he had told the truth, but not all of it, for, you can believe me or not, his stock of parts all told could have been put in a wheelbarrow and not overburdened a small child.

"The loss on that excavating job was small—only about \$500 in forfeits—and I more than made that up on the rest of the work, but it taught me a lesson, and I don't take any more chances on poor service."

"How is the dealer who handles the 'XYZ' truck you're now using?" I asked. "Does he give you the right kind of service?"

For answer the contractor stepped to the telephone and called the dealer in question.

"How near done is that two-tonner my driver left in there last evening for repairs?" he asked. Then "all right,

PROMPTNESS PRIME FACTOR IN TRUCK SERVICE.

This article is written for the dealer who has not found the secret of true success in selling trucks. It shows that **SERVICE SELLS** rather than **VERBAL SALESMANSHIP**, although the two are inseparable and come under one head. The truck owner does not expect free service. He wants—and demands—**PROMPT** service.

Since the service department will pay cash dividends from its inception—aside from the increased revenue from the replacement business that prompt service guarantees—where is the dealer who can give a tangible reason why he should not have the best service department possible? Every truck ever built—because it is used—will eventually need service. This service, in order to make future business, must be **PROMPT** and **RELIABLE**. You can't sell trucks without service, and there is plenty of substantial evidence to prove that this is true.

thanks," he said, and hung up the receiver. "They tell me the driver got it this morning at 7:30," he laughed. "That's a good answer to your question,

ger car that there is in getting the truck out of the shop and on to the road. The truck must be gotten back into service just as soon as it is possible for the deal-

er to get it there, while the passenger car, though used almost wholly for business nowadays, can frequently be dispensed with by its owner for a few days

actually losing cold dollars when he is forced to wait for some necessary part to come from the factory.

The truck dealer owes it to himself, to

TALE OF TWO DEALERS.

Number 1.

Sat around whining about the "old days" when he sold a raft of trucks. Let his salesmen go, shut down on service, spent his time in condemning the whole industry to oblivion.

Number 2.

Adopted intensive sales methods. Studied trade journals to see how others were getting business. Put in long hours, kept run of salesmen, devised new ways to stimulate business, portrayed optimism.

Which one of these two men got the orders? Which one of them will do the big business 10 years hence? The first has forgotten that "Tempus Fugits." He's still worrying for fear they'll get him in the draft. He doesn't know the war is over and he probably thought it was the Civil War anyway. The second has thankfully taken the good business that has been given him with the last few years. Now he's out to get the same amount out of the next few years if it's humanly possible for him to do so. He'll do it, too.

since he can use the street cars if it is absolutely necessary. True enough, he may grumble and complain at having his machine laid up for days, and he has a right to do so, but he can get along without it far better than the truck owner can without his truck. He isn't losing money and therefore isn't wholly dependent on it, whereas the truck owner uses his machine for making money, and is

his customer and to the factory he represents to lay in an adequate stock of parts. He gets his franchise through promising to do this, and it is to be regretted that certain dealers are still taking this promise lightly.

Many dealers do not carry a stock of parts. They claim that they cannot do this because it ties up too much money. This is short-sightedness of the most

sordid, senseless kind. What would you think of a wheelwright who had to send to the factory every time he needed a few more spokes to repair a wheel? Or a cobbler who waited until he got the shoes to mend before sending to the factory to get the leather? You can't get milk from a cow without first feeding her, and by the same token you cannot get a lasting profit from selling trucks unless you have the proper equipment to service them. This is logical enough apparently. Of course the truck dealer cannot do much business without capital. If he hasn't the money to swing the deal he should never attempt to do so. That's understood, or should be, at least.

To sum up the whole thing, a good profitable business in truck selling can only be done through the giving of prompt service. Prompt service can only be given through the use of adequate parts and equipment. The cash outlay necessary to give service is more than compensated by the increased revenue, FROM THE SERVICE JOB ITSELF, as well as from the future sale of new cars. Therefore, where is there any reason for the dealer to refuse to properly equip his station with the necessary tools and parts stock; or in other words, since the profit increases faster than the outlay necessary to obtain this profit when the business is properly conducted, why should the dealer refuse to do business in a businesslike manner?

Reasons Why We Want Good Roads

There are about 101 good reasons why motorists should boost hard for a large road-building programme this year. Here are a few of them:

1. To increase the comfort and pleasure of riding.
2. To lessen tire expense and tire trouble.
3. To decrease wear and tear on the automobile.
4. To decrease cost of operation.
5. To save time or make greater mileage possible.
6. To decrease unemployment.

7. To reduce cost of commodities by decreasing cost of transportation.

8. To decrease unemployment and automatically to increase the general prosperity of the country.

9. To reduce crime—most of the hold-ups, burglaries, etc., are perpetrated by men out of work, many of whom would be employed if a large road building programme were set on foot.

10. To increase retail turnover and put more money in circulation. This is accomplished by putting more men to work. How are motorists interested in this? Because many of them are retailers; manufacturers who sell to retailers, or men that do business of some sort with retailers.

11. To reduce discontent. A busy man is generally a hard subject for agitators.

These are 11 of the principal reasons. Most of the other 90 are offshoots of these, but all of them are relatively important.

How can motorists start a road building movement? Well they are nearly all voters. According to latest statistics, about one in every 12 of the citizens of the U. S. owns an automobile; therefore, a rather large body of voters is represented in their ranks. What so many voters want (if it is reasonable, as this is,) is usually possible of attainment when the proper authorities are approached in the proper way.

TRUCK DRIVERS SHOULD BLOCK WHEELS ON HILL.

Motor truck drivers should make it an invariable rule to block the rear wheels of a truck when they leave it for any length of time standing on an incline, whether the truck be headed up or down hill does not alter the case. Many drivers leave their trucks standing with the emergency brake on and the engine running, while they are making calls. This is a very dangerous practise and should be avoided when possible. Blocking the wheels will help in a measure, while running the forward wheel diagonally against the curb will still further prevent

the truck from starting off, if the brake should work loose. Small boys sometimes will get into a truck that has been left standing and, after playing with the various levers, may let off the emergency brake, allowing the truck to run down grade with the result that a bad accident may occur, damaging the truck and perhaps injuring the boy, besides creating other damage that is irreparable.

Two good blocks of wood should be carried in a convenient place on the truck and it should be made a practise when leaving the truck for any length of time to block the rear wheels, and accidents of this kind may be prevented. It is, however, the best plan to stop the en-

gine for the vibrations set up by its running idle have been known to jar the brakes loose and start the car off without a driver. It is a simple matter to start the engine again without cranking, by loosening the brakes when the driver wishes to start, allowing the car to coast for a short distance, putting the gears of the transmission in high, letting in the clutch against the dead engine and turning it over with the momentum of the car, thus starting the engine with a minimum of effort. This feature can be repeated as often as the stops are made on a down grade, thus saving gas, wear and tear of the engine, and minimizing the danger of the car starting of itself.

CARE AND MAINTENANCE OF HYDRAULIC HOIST.

Like any other mechanical device the horizontal hydraulic hoist must be properly cared for if the longest and best service are to be realized. Observance of the following suggestions will assist materially in keeping this equipment in the best possible working condition:

Hoist should be examined once a week to see that cylinder is fitted with oil. To do this proceed as follows: Raise body high enough to get at hoist. Use wooden props to hold body in raised position. Place control lever in "lowering" position. Pull lifting arms down by hand. Remove all pipe plugs on top of cylinder. Pour light oil in large hole on top of cylinder at rear end. With control handle in "raising" position, rotate pump by hand until oil flows out of small hole on top of cylinder, front end. This assures that all pipes will be filled and air removed. Replace all plugs tightly. Start hoist and lift body from wooden props.

If air is found in the oil in sufficient quantity to interfere with the action of the hoist, it may be removed in the following manner. Raise body and prop in position, as described above, and remove plugs. If considerable quantity of air is present in oil, be careful to loosen plugs slightly at first and allow excess of air to escape before removing plug entirely. After foaming at filling hole has ceased, pour oil in slowly, which will force the foaming oil out of holes. Also rotate pump by hand slowly to help out in the air removing operation. Be careful to see that all pipe connections are tight, and that stuffing box around piston rod is tight enough to prevent any oil drip.

Always use clean oil of proper consistency to flow freely. Mobile B grade is recommended both for summer and winter use. If in doubt about oil now being used, drain hoist and fill with oil as described above.

See that piston packing leather is always in good condition and that relief valve in piston is in working order. To make sure on these points, proceed as follows: With body blocked up, drain oil from hoist. Disconnect crosshead from piston rod, remove cylinder head and withdraw piston rod assembly. Examine the upper leather packing carefully to be sure same is not cut or torn at any point. Should piston leather be cut or torn, remove and replace with new leather. Before removing piston from rod, the relief valve cage must be unscrewed from piston.

Examine relief valve and spring, being sure that spring presses valve tightly against its seat, that valve has an oil-tight bearing on its seat and operates freely in its cage or housing.

Do not decide to remove piston assembly until you have carefully checked up on quantity of oil and position of control valve and have examined carefully all pipe joints.

To ascertain whether pump is worn: Disconnect pump driving shaft and if gears or body are badly worn, it will be indicated by excessive endwise movement of shaft. On new pumps, or pumps

Motor Truck Prices Changed Since

Date	Truck	Tons Capacity	Old Price	New Price	Decrease Increase
June 1, 1921.....	Ace	1½	\$2,745	\$2,295	\$450
June 1, 1921.....	Ace	2½	3,450	2,795	655
April 20, 1921.....	Akron	1	2,685	1,995	690
Jan. 1, 1921.....	Atterbury 7—CX.....	2½	3,575	3,375	200
Jan. 1, 1921.....	Atterbury 7—D.....	3½	4,375	4,175	200
Jan. 1, 1921.....	Atterbury 8—E.....	5	5,975	5,575	400
June, 1921.....	Available H 5.....	5	5,575	5,375	200
Oct., 1920.....	Available H 7	7	6,000	6,875	+ 875
June, 1921.....	Available H 7.....	7	6,875	6,000	875
June 1, 1921.....	Bessemer G.....	1	1,700	1,395	305
June 1, 1921.....	Bessemer H 2.....	1½	2,445	1,995	450
June 1, 1921.....	Bessemer J 2	2½	3,285	2,595	690
June 1, 1921.....	Bessemer K 2.....	4	4,485	3,495	990
June 1, 1921.....	Chevrolet G.....	.....	920	820	100
June 1, 1921.....	Chevrolet T .....	.....	1,325	1,225	100
Oct. 15, 1920.....	Commerce T*.....	¾-1½	1,350	1,450	+ 100
July 1, 1921.....	Corbitt D Special.....	1½	2,400	2,200	200
July 1, 1921.....	Corbitt C Special.....	2	2,800	2,600	200
July 1, 1921.....	Corbitt C.....	2	3,500	3,150	350
July 1, 1921.....	Corbitt B.....	2½	3,650	3,300	350
July 1, 1921.....	Corbitt A.....	3½	4,500	4,100	400
July 1, 1921.....	Corbitt AA.....	5	5,500	5,000	500
Mar., 1921.....	Day-Elder—A	1	2,100	2,225	+ 125
Oct., 1920.....	Day-Elder—B	1½	2,450	2,300	150
Mar., 1921.....	Day-Elder—B	1½	2,300	2,425	+ 125
Oct., 1920.....	Day-Elder—D	2	2,950	2,750	200
Mar., 1921.....	Day-Elder—D	2	2,750	2,900	+ 150
Oct., 1920.....	Day-Elder—C	2½	3,150	2,950	200
Mar., 1921.....	Day-Elder—C	2½	2,950	3,125	+ 175
Oct., 1920.....	Day-Elder—F	3½	3,950	3,700	250
Mar., 1921.....	Day-Elder—F	3½	3,700	3,950	+ 250
Oct., 1920.....	Day-Elder—E	5	4,950	4,600	350
Mar., 1921.....	Day-Elder—E	5	4,600	4,875	+ 275
May, 1921.....	Denby 12	1	2,400	2,200	200
July 1, 1921.....	Denby 25.....	3	3,600	3,300	300
July 1, 1921.....	Denby 27.....	4	4,600	4,200	400
July 1, 1921.....	Denby 210.....	5	5,350	4,850	500
Oct. 4, 1920.....	Diamond T-T	1½	2,800	2,450	350
Jan. 1, 1921.....	Diamond T-T	1½	2,450	2,650	+ 200
Oct. 4, 1920.....	Diamond T-U.....	2	3,485	2,835	650
Jan. 1, 1921.....	Diamond T-U.....	2	2,835	3,285	+ 450
Oct. 4, 1920.....	Diamond T-K.....	3½	4,825	3,925	900
Jan. 1, 1921.....	Diamond T-K.....	3½	3,925	4,675	+ 750
Oct. 4, 1920.....	Diamond T-EL.....	5	5,675	4,615	1,060
Jan. 1, 1921.....	Diamond T-EL.....	5	4,615	5,400	+ 785
Oct. 4, 1921.....	Diamond T-S.....	5	5,900	4,800	1,100
Jan. 1, 1921.....	Diamond T-S.....	5	4,800	5,650	+ 850
Oct. 4, 1920.....	Diamond T-FS.....	1½	3,100	2,715	385
Jan. 1, 1921.....	Diamond T-FS.....	1½	2,715	2,960	+ 245
June 8, 1921.....	Dodge Panel .....	.....	1,330	1,135	195
June 8, 1921.....	Dodge Screen.....	.....	1,270	1,035	235
Apr. 1, 1921.....	F. W. D.—B.....	3	4,900	4,200	700
Oct., 1920.....	Federal SD.....	1	2,600	2,500	100
Oct., 1920.....	Federal TE.....	1½	2,825	2,725	100
Oct., 1920.....	Federal UE.....	2	3,150	3,025	125
Oct., 1920.....	Federal WE.....	3½	4,100	3,950	150
Oct., 1920.....	Federal XE.....	5	4,750	4,600	150
Oct., 1920.....	Federal Trac.....	3	3,325	3,200	125
Oct., 1920.....	Federal Trac.....	7	4,300	4,150	150
June 7, 1921.....	Ford TT.....	1	545	495	50
Apr. 1, 1921.....	Garford 25—B.....	1½	2,290	2,090	200
Apr. 1, 1921.....	Garford 70—H.....	2	3,450	3,190	260
Oct. 15, 1920.....	Gramm-Bernstein—15†	1½	2,250	2,050	200
Oct. 15, 1920.....	Gramm-Bernstein—65†	1½	2,775	2,725	50
Oct. 15, 1920.....	Gramm-Bernstein—20†	2	3,275	3,175	100
Oct. 15, 1920.....	Gramm-Bernstein—25†	2½	3,875	3,575	300
Oct. 15, 1920.....	Gramm-Bernstein—30**	3	4,775	4,525	250
Oct. 15, 1920.....	Gramm-Bernstein—35†	3½	4,775	4,375	400
Oct. 15, 1920.....	Gramm-Bernstein—50†	5	5,875	5,275	600
Oct., 1920.....	Indiana—12	1½	2,425	2,290	135
Oct., 1920.....	Indiana—20	2	3,140	2,950	190
Oct., 1920.....	Indiana—25	2½	3,350	3,150	200
Oct., 1920.....	Indiana—35	3½	4,150	3,750	400
Oct., 1920.....	Indiana—51	5	5,075	4,795	280
Mar., 1921.....	Indiana—51	5	4,795	4,775	20
June 9, 1921.....	International 21.....	1	1,850	1,750	100
June 9, 1921.....	International 31.....	1½	2,050	1,850	200
June 9, 1921.....	International 41.....	2	2,400	2,100	300
June 9, 1921.....	International 61.....	3	2,800	2,400	400
June 9, 1921.....	International 101.....	5	4,500	3,600	900
Oct., 1920.....	Jumbo—15	1½	2,850	2,425	425
Oct., 1920.....	Jumbo—20	2	3,100	2,675	425
Oct., 1920.....	Jumbo—25	2½	3,450	3,090	360
Oct., 1920.....	Jumbo—30	3	3,950	3,590	360
Oct., 1920.....	Jumbo—35	3½	4,556	4,080	476
Oct., 1920.....	Jumbo—40	4	5,200	4,730	470
June, 1921.....	Kalamazoo G—1	1½	2,800	2,495	305
June, 1921.....	Kalamazoo K	3½	4,400	4,300	100
Dec. 5, 1920.....	Kelly Spfd—K31	1½	3,000	2,900	100
Dec. 5, 1920.....	Kelly Spfd—K34	1½	3,000	2,900	100
Dec. 5, 1920.....	Kelly Spfd—K35	2½	3,500	3,250	250
Dec. 5, 1920.....	Kelly Spfd—K36	2½	3,500	3,250	250

Sept. 1, 1920, Revised by N. A. C. C.

Date	Truck	Tons Capacity	Old Price	New Price	Decrease Increase
Dec. 5, 1920.....	Kelly Spfd—K40	3½	4,400	4,200	200
Dec. 5, 1920.....	Kelly Spfd—K41	3½	4,650	4,200	450
Dec. 5, 1920.....	Kelly Spfd—K42	3½	4,650	4,200	450
Dec. 5, 1920.....	Kelly Spfd—K50	5	5,100	4,900	200
Dec. 5, 1920.....	Kelly Spfd—K60	6	5,500	5,100	400
Oct., 1920.....	Kleiber AA	1	2,400	2,600	+200
Oct., 1920.....	Kleiber A	1½	2,800	3,100	+300
Oct., 1920.....	Kleiber BB	2	3,200	4,000	+800
June 24, 1921....	Kleiber BB	2	4,000	3,600	400
Oct., 1920.....	Kleiber B	2½	3,800	4,200	+400
June 24, 1921....	Kleiber B	2½	4,200	3,950	250
Oct., 1920.....	Kleiber C	3½	4,400	4,900	+500
June 24, 1921....	Kleiber C	3½	4,900	4,600	300
Oct., 1920.....	Kleiber D	5	5,300	5,600	+300
June 24, 1921....	Kleiber D	5	5,600	5,300	300
Mar., 1921.....	Maccar H	2½	3,750	3,650	100
June, 1921.....	Maccar H—2	2½	3,650	3,750	+100
Oct., 1920.....	Master F	5	5,450	5,490	+40
Jan., 1921.....	Master F	5	5,490	5,440	50
Oct., 1920.....	Master Trac. T.....	6	3,050	3,740	+690
Oct., 1920.....	Maxwell	1½	1,472	1,332	140
June 15, 1921....	Moreland 21—B	1½	3,125	2,800	325
June 15, 1921....	Moreland 21—C	2½	3,900	3,500	400
June 15, 1921....	Moreland 21—H	4	4,975	4,600	375
June 15, 1921....	Moreland 21—J	5	5,350	5,000	350
July 2, 1921.....	Oldsmobile .....	.....	1,500	1,250	250
Apr., 1921.....	Oneida 2—E	2	2,800	2,600	200
Jan. 31, 1921....	Packard EC	2	3,850	3,700	150
July 5, 1921....	Packard EC	2	3,700	3,500	200
Jan. 31, 1921....	Packard ED	3	4,900	4,450	450
July 5, 1921....	Packard ED	3	4,450	4,100	350
Jan. 31, 1921....	Packard EF	5	5,950	5,550	400
July 5, 1921....	Packard EF	5	5,550	4,500	1,050
Jan. 31, 1921....	Packard EX	2	4,650	4,200	450
July 5, 1921....	Packard EX	2	4,200	4,000	200
Jan. 1921.....	Paige 51—15	3½	4,385	4,285	100
May, 1921.....	Rainier R—20	2½	3,650	3,600	50
Mar., 1921.....	Republic 10	1	1,665	1,695	+40
Mar., 1921.....	Republic 11X	1½	2,195	2,295	+100
Mar., 1921.....	Republic 20	3½	3,895	3,845	50
May, 1921.....	Riker BB	4	4,700	4,800	+100
Mar., 1921.....	Rowe CW	1½	2,800	3,000	+200
May, 1921.....	Samson—E25	1½	1,185	1,395	+210
Jan., 1921.....	Sandow—G	1	2,295	2,195	100
Mar., 1921.....	Sandow—G	1	2,195	2,295	+100
Jan., 1921.....	Sandow—CG	1½	2,590	2,490	100
Mar., 1921.....	Sandow—CG	1½	2,490	2,590	+100
Jan., 1921.....	Sandow—J	2½	3,375	3,175	200
Mar., 1921.....	Sandow—J	2½	3,175	3,375	+200
May, 1921.....	Sandow—J	2½	3,375	3,275	100
Jan., 1921.....	Sandow—M	3½	4,395	4,095	300
Mar., 1921.....	Sandow—M	3½	4,095	4,295	+200
Jan., 1921.....	Sandow L	5	5,175	4,775	400
Mar., 1921.....	Sandow—L	5	4,775	4,975	+200
Oct., 1920.....	Selden A	1½	2,460	2,360	100
Oct., 1920.....	Selden A	2½	3,550	3,425	125
Oct., 1920.....	Selden A	3½	4,325	4,175	150
Oct., 1920.....	Selden A	5	5,770	5,600	170
Sept. 1, 1920....	Standard 1K	1½	2,250	1,950	300
Sept. 1, 1920....	Standard 76	2½-3	3,520	3,100	420
Sept. 1, 1920....	Standard 66	3½-4	4,410	4,000	410
Nov. 20, 1920....	Stewart 11	¾	1,450	1,350	100
Nov. 20, 1920....	Stewart 12	1	1,850	1,750	100
Nov. 20, 1920....	Stewart 9	1½	2,450	2,200	250
Nov. 20, 1920....	Stewart 7	2	3,075	2,900	175
Nov. 20, 1920....	Stewart 7X	2½	3,200	2,950	250
Nov. 20, 1920....	Stewart 10 & 10X.....	3½	4,100	3,850	250
Oct., 1920.....	Traffic—C	2	1,495	1,595	+100
Mar., 1921.....	Traylor B	1½	2,075	2,500	+425
Mar., 1921.....	Traylor C	2	2,875	3,000	+125
Mar., 1921.....	Traylor D	3	3,375	3,500	+125
Mar., 1921.....	Vellie 46	1½	1,925	2,200	+275
Mar., 1921.....	Vim	1½	1,355	1,555	+200
May, 1921.....	Vim 29	1½	1,555	1,355	200
June 13, 1921....	White 15	¾	2,600	2,400	200
June 13, 1921....	White 20	2	3,450	3,250	200
June 13, 1921....	White 40	3½	4,500	4,200	300
June 13, 1921....	White 45	5	5,000	4,500	500
June 10, 1921....	Wilson F	1½	2,650	2,270	380
June 10, 1921....	Wilson E A	2½	3,300	2,825	475
June 10, 1921....	Wilson G	3½	4,300	3,685	615
June 10, 1921....	Wilson H	5	5,275	4,520	755
Oct., 1920.....	Winther—70	3½	4,250	4,200	50

+Increase.

*Cord pneumatic tires, electric light and starter.

**Priced on cord pneumatic tires only.

†Includes cab fully equipped, electric generator, lights, hubodometer, etc.

‡Same as † with still further equipment—towing hooks, trailer, drawbar, etc.

in good condition, this shaft has only about three one-thousands of an inch end play. When replacing gasket between cover and body of pump, use very thin paper, one thickness only.

Should pump leak at stuffing box around drive shaft or control valve shaft, carefully tighten stuffing box.

In ordering any part that may be broken or missing, give hoist number shown on label plate attached to cylinder and truck number.

A SERVICE INNOVATION.

All kinds of difficulties arise in the course of rendering speedy, satisfactory service to motor truck owners, but perhaps the greatest of these lies in the vast distances a truck can travel from the source of supply in its particular region. In their efforts to overcome this, Mack truck representatives in the far West have created considerable interest by utilizing the air plane to make deliveries of parts and render repair service.

Some time ago the Richards Motor Co., distributor for Mack trucks in Utah, sold a Mack AC to H. E. Vincent, who was engaged in road construction work at Spanish Fork, Utah. Recently the oil gauge on the machine broke and it was necessary that repairs be made as soon as possible, so he wired the circumstances to A. B. House, territory man for the Mack International Motor Truck Corporation, and immediately Mr. House employed Pilot Hal Bullen to take him by airplane with a mechanic to Spanish Fork with a new gauge.

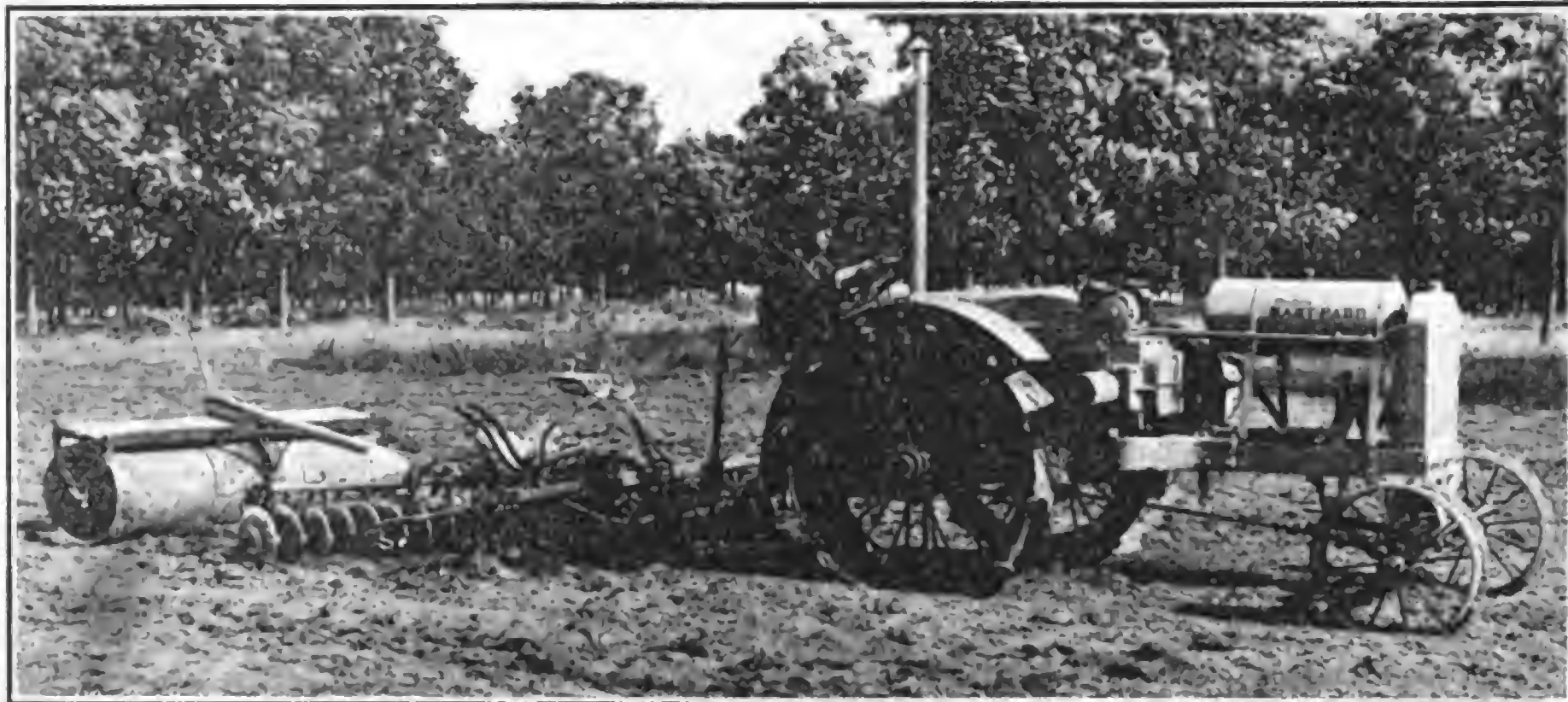
The flight of 75 miles was made in 40 minutes. So much excitement was created at Spanish Fork by the arrival of the plane and its party, that almost the entire populace of the town turned out and Mayor I. P. Snell personally congratulated the Mack party on its innovation. It is needless to say that Mr. Vincent was highly enthused over the service rendered. In another instance, the airplane was brought into use again by J. L. Warner who is the Mack territory representative at Seattle. Mr. Warner was at Yakima, Wash., to sign a distributor's contract with the Rovig Lumber Co., when he learned that the party whose signature was necessary to the contract, was at Ellenburg, about 50 miles away, and that he would soon leave for parts unknown. Mr. Warner enlisted the services of an aviator to take him to Ellenburg by airplane, and the two arrived in time to complete negotiations. Later a Mack sign was attached to the plane.

USED CAR DEALERS TO HOLD SHOW.

The Used Car Buyers' Guides section of the Automobile Dealers' Association of New York will hold a used car show in New York City during the late summer or early fall. The publication committee of the Dealers' association will have full charge.

If the show is held during the late summer it will be open to all types of reconditioned and refinished used or exchange cars offered for sale by the leading distributors of new cars.

LATE TRACTOR MODELS ON MARKET



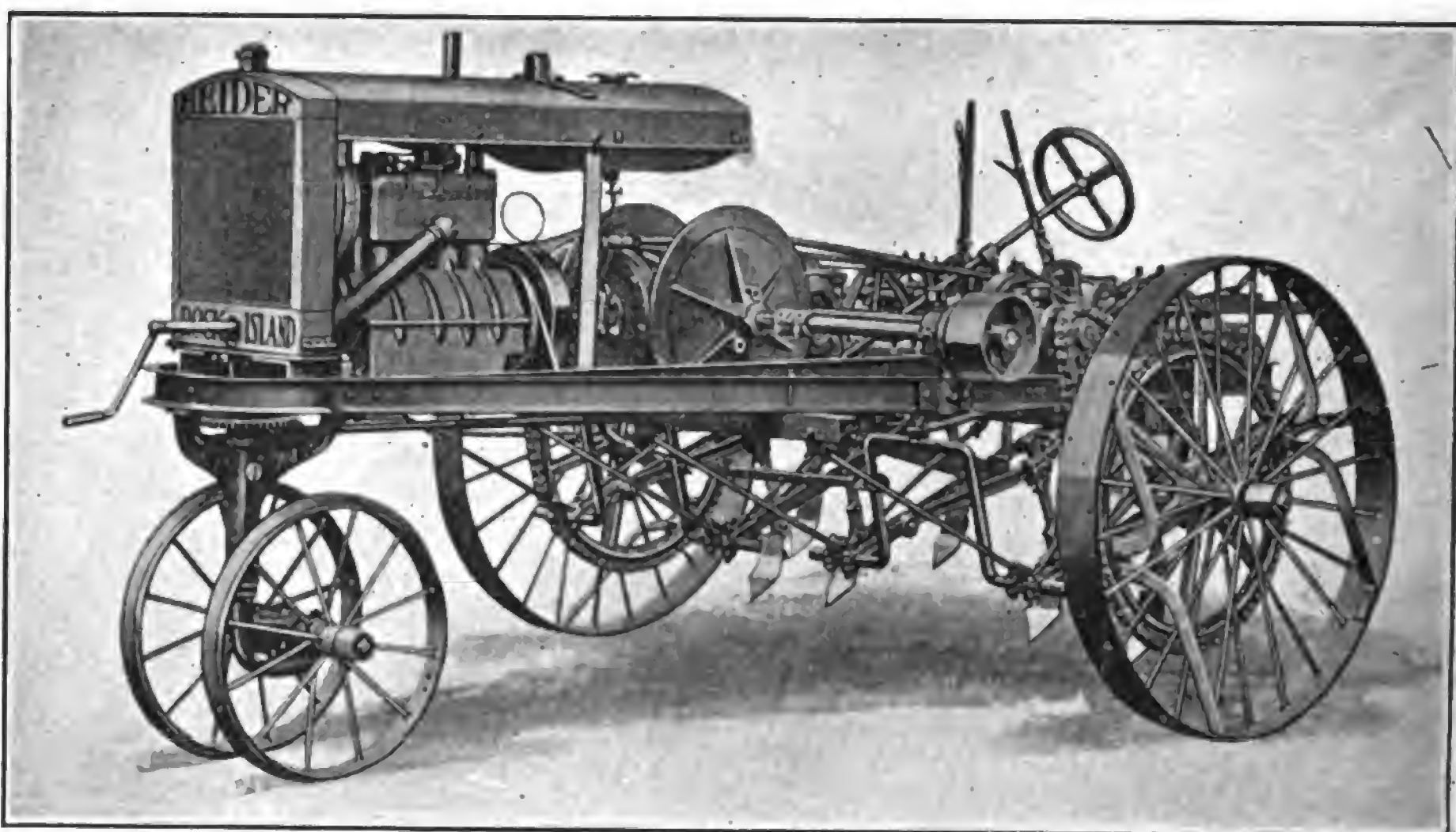
Hart-Parr "30" Tractor Operating on a Farm Near Charles City, Ia., Made by Hart-Parr Co., Charles City, Ia.

HART-PARR "30" TRACTOR.

Engine—Hart-Parr Two-Cylinder Horizontal.
Bore and Stroke—6½ by Seven Inches.
Horsepower—30 at 750 Revolutions a Minute.
Cooling—Perfex Radiator and Pump.
Fuel—Kerosene or Distillate.
Carburetor—Schebler, ½-Inch and Hart-Parr Air Cleaner.
Ignition—K-W High-Tension Magneto.
Lubrication—Full Force Feed.
Length Overall—141 Inches.
Width Overall—71 Inches.
Number of Plows—Three 14-Inch.
Clutch—Contracting Band Type.
Transmission—Hart-Parr Fitted with S. K. F. Bearings.
Rear Axle—Hart-Parr Fitted with Hart-Parr Bearings.
Final Drive—Internal Gear.

HEIDER 5-10 MOTOR CULTIVATOR.

Engine—Le Roi Four-Cylinder Vertical, Equipped with LeRoi Governor.
Bore and Stroke—3½ by 4½ Inches.
Horsepower—Five at Draw Bar and 10 on Pulley.
Cooling—Thermo-Syphon System and Perfex Radiator.
Fuel—Gasoline.
Carburetor—Kingston, Equipped with Bennett Air Cleaner.
Ignition—Dixie High-Tension Magneto.
Lubrication—Force and Splash.
Length Overall—136 Inches.
Width Overall—98 Inches.
Clutch—Friction.
Transmission—Friction, Seven Speeds Forward and Seven Reverse.
Rear Axle—Dead Type Wheels Equipped with Sprockets and Driven by Chain from Jack Shaft.
Final Drive—Chains.



Heider 5-10 Motor Cultivator Supplies Belt Power as Well as Handling Light Field Operations. Made by Rock Island Plow Co., Rock Island, Ill.



Best "30" Tractor Hauling Road Leveller and Scraper. Made by C. L. Best Tractor Co., San Francisco, Cal.

BEST 30 CATERPILLAR TYPE TRACTOR.

Engine—Best Four-Cylinder Vertical, Cast Singly.
Bore and Stroke—4¾ by 6½ Inches.
Horsepower—20 at Draw Bar. 30 at Belt, at 800 R. P. M.
Cooling—Thermo-Syphon, Best Radiator.
Fuel—Vacuum Feed Water Injected with Fuel.
Governor—Best.
Carburetor—Ensign.
Ignition—Berling, High-Tension.
Lubrication—Circulating Splash.
Steering—Power Device.
Size of Pulley—12 by Seven Inches.
Number of Plows—Four.
Clutch—Disc, Best Make.
Transmission—Two Speeds Forward.
Final Drive—Gear Driven.



Pierce-Arrow Truck No. 1 and a Late 1921 Model in Front of Boston Sales Room at End of 20th Anniversary Run from New York to Boston.

PIERCE-ARROW ANNIVERSARY RUN SHOWS 10 YEAR AD- VANCE IN TRUCK DESIGN

PROGRESS achieved in a decade of motor truck manufacture was recently demonstrated by the Pierce-Arrow Motor Car Co., Buffalo, N. Y., when the historic New York to Boston run made in 1911 by America's first worm-drive truck was repeated.

The identical truck which made the run in 1911, known as Pierce-Arrow truck No. 1, covered the route again. It was accompanied this time, however, by the latest product of the Pierce-Arrow company, a Dual-Valve five-ton unit.

Although more than 10 years old and with 175,000 miles of daily service to its credit, the veteran clipped two hours and 20 minutes from the 20-hour record made 10 years ago. But the old timer was no match for its modern brother, which made the 240-mile journey in 14 hours and 43 minutes, its engine governed to normal speed.

Truck No. 1 performed just as its makers designed it to perform 10 years ago. Old as it is the truck fulfilled the speed, load-carrying and endurance specifications which it was originally designed to meet.

The record made by the Dual-Valve truck presents a contrast which shows strikingly the advance of manufacture and design. Equipped with this super-power plant the five-ton truck carried its five-ton load over the road in three hours less time. High gear speed was used on hills; even greater coasting ability and a faster normal speed told against the surprising performance of the veteran.

Ease of control and driver comfort were other factors that counted in the test. Harry Ward who, by the way, drove truck No. 1 on its 1911 test, did not find it excessively fatiguing to make the New York-Boston run in the Dual-Valve model in one day, despite the fact that he now is not accustomed to steady truck driving. He left New York at dawn and not long after dark the same day he arrived in Boston.

The old-time truck, which does not have the electric lighting equipment now standard with Pierce-Arrow, remained over night in Worcester, arriving in Boston the following morning.

Thus, to the qualities of durability and reliability, for which Pierce-Arrow has

been noted, has been added more power, greater speed and greater utility.

Truck No. 1 is historic in automotive history, as it is one of the famous "first 50" group of Pierce-Arrow trucks, 48 of which outlasted nine years of service. Its 10th anniversary run between New York and Boston, which it recently made, was not the first occasion on which it repeated its 1911 performance. It also made the run on its seventh anniversary in 1918, running fully loaded and with its tool box sealed.

This veteran is privately owned by a Buffalo firm and has been returned to them for added years of active service.

WOMEN'S INTEREST IN HIGHWAY MATTERS.

At the recent meeting of the biennial council of the General Federation of Women's clubs held at Salt Lake City, the delegates present, representing some 2,000,000 American women, strongly endorsed the creation of a Federal Highway commission as embodied in the measure introduced by Senator Townsend. In this connection Mrs. John Dickenson Sherman, chairman of the department of applied education of the General Federation of Women's clubs, said:

"It is not necessary for us to point out the real interest of American women in highway matters. The influence of real highways on country life, on economics, on education, is now generally understood. What is needed now is a national highway policy which will conserve government funds and, through concentration of federal money on main highways, will give us a connected system at the earliest moment and the least expense.

WINSOR GRAVITY END DUMP BODY FOR FORDS SHOWS DISTINCTIVE FEATURES

The accompanying illustration shows a one-ton water level capacity dump body, manufactured by the Transportation Equipment Co., Detroit, Mich. This capacity may be increased by applying a top box. It operates by gravity in discharging the load and also returns to load-carrying position by gravity. The tail gate is equipped with chains, which are adjustable so as to limit the tail gate opening for spreading material. The driver does not have to leave his seat to discharge the load. The angle of discharge is 45 degrees.

This outfit is built in one, two, three and four-yard capacity. The body remains in the dumping position until allowed to come back at the will of the operator.

To discharge the material the driver pulls a cable, which extends from the cab to a lock lever. This operation releases the hooks which maintain the body in its load-carrying position, thus allowing the body to roll slowly to its dumping position. As soon as the body starts to roll the driver lets go of the cable and the lock lever falls on the angle iron and slides along as the body rolls. When the lock lever reaches one of the notches it falls into the same, thereby holding the body at a discharging position. The lever which automatically releases the tail gate starts to operate when the lock lever reaches the first notch on the angle iron, but does not release the tail gate so it can open until the lock lever has reached the second notch when the body has assumed a full dumping position with a 45-degree angle of discharge.

This body can be attached to a Ford chassis in 15 minutes and it is unnecessary to make any changes in the chassis as all the material needed for installing the dump body is furnished by the manufacturer.

The Wheeler-Schebler Carburetor Co., Indianapolis, Ind., announces that George T. Briggs has again joined that organization in the capacity of general sales manager. Mr. Briggs was recently general manager of the Motorcycle & Allied Trades association.



Winsor One-Ton Level Capacity Dump Body, Made by Transportation Equipment Co., Detroit, Mich.



Transport Truck Transporting Elephant for a Moving Picture Company.

"JUMBO" GOES JOY RIDING.

In the old circus days the elephant used to push the cars around. Now "Jumbo" rests while his private automobile carries him around. This is one of the advantages of being a moving picture star as this pachyderm is. The cinema has changed many things. Here you see the African transport being borne by the American transport.

"The elephant as you know, is one of the most cautious of animals," said F. L. Edman of the Transport Motor Truck Co., Mount Pleasant, Mich. "Before he crosses a bridge or steps on a platform he carefully tests its strength with a fore leg. When this wise elephant saw the name 'Transport' on the truck he never hesitated. He walked aboard without the slightest urging. Jumbo's chauffeur and groom are with him. Pretty heavy load for a 2½-tonner.

MONARCH TRACTOR PLANT SOLD.

E. D. Caldwell of New York was the highest bidder for the assets of the Mon-

the public auction conducted at the plant arch Tractor Co. of Watertown, Wis., at



Cyclone Truck Used by City of Greenville, S. C., in Road work and Hauling Convicts.

by the trustee in bankruptcy, William B. Roys of Madison, Wis. The price of

\$44,000 was accepted subject to approval by the bankruptcy court. The Monarch Co., together with its parent corporation, General Tractors, Inc., Paulsboro, N. J., recently was made defendant in bankruptcy proceedings and the entire properties were ordered sold. Mr. Caldwell is a large stockholder in the General Tractors Co. and a principal creditor as well.

CYCLONE TRUCK PAYS FOR ITSELF IN YEAR.

The city of Greenville, S. C., finds that by using a model A 3000-pound Cyclone truck in road work and hauling the convicts back and forth from the convict camp, they will make a saving sufficient to pay for the cost of the truck in one year.

The convicts were formerly hauled to and from their work on mule-drawn wagons, which lost the city a great deal of time.

The use of the motor truck for road

work is increasing rapidly and other cities that have tried the method find with Greenville that the saving over horse or mule-drawn vehicles not alone means a great saving in time which gives a cash value, but that the workers are in better condition to start in when they arrive on the job.

WINTHER FOUR-WHEEL DRIVE HAULING LOGS.

Quigley & Roberts, Grant's Pass, Ore., has been using a 3½-ton Winther Four-Wheel drive truck in hauling saw logs for several months. For the first four months the owners state that the truck was in continuous service 24 hours a day, practically with scarcely time to let the engine cool. It is engaged in hauling yellow and bull pine logs down the side of a mountain where the grades range from 15 per cent. on the average to 32 per cent., with plenty of hair pin turns. Two men are required on the truck, one to operate the truck brakes, the other the brakes on the semi-trailer.

At the time that this picture was taken this Winther truck was making a gross profit of \$3000 a month for its owners.



Winther Four-Wheel Drive Truck in Service in Hauling Logs for Quigley & Roberts, Grant's Pass, Ore.

Paying for "Dead Horses" with Reluctant Dollars

Do You Need Cash? Why Not Collect Those Customer Accounts—They Are Holding Up the Parade—Get Your Money Without Losing the Customer If Possible—But Get It Anyway—It's Yours.

WAS there ever a time in the history of business when the retailer had such a large total of unpaid accounts on his books? Probably not. Credit has been easy during the flush period of the war and many have established a certain financial standing who would not have been considered good risks a few years ago.

This has resulted in a larger gross amount of debts which, because of prosperous times, has been turned over almost like cash—until very recently. Now it is changed. Business has been somewhat backward, wages have lowered slightly and work is not too plentiful, with the result that bills have not been paid as promptly as they should have been, all of which, quite naturally, has caused the conditions set forth in the foregoing paragraph.

Every business man realizes this, but talking about the cause won't help the effect—unless money does the talking. There is just as much cash today as there was a year ago—somewhere. The hard part is to get it into circulation. This state of affairs is somewhat analogous to the story of the city jeweller who went to the country to raise chickens. A year sufficed for him and he was back at his old job.

But he insisted that there was plenty of money in the chicken business. He knew, because he had put it there. The job of getting it out was another matter. And by the same token good times have put plenty of money into the pockets of the consumer, but with the slowing up of business they are one-way pockets apparently. It will take more than diplomacy to get it generally into circulation again.

It is reassuring to know that the per capita wealth of the country, as shown by the sure barometer of savings accounts, is greater today than ever. People can pay their bills if they want to. Thus the retailer can square up with the wholesaler, the wholesaler with the manufacturer and the manufacturer with his bank—if a way can be found to start the ball a rolling.

MOTOR TRUCK'S several service men have carefully reviewed this matter. Its representatives have talked with bankers and other business men in all parts of the country with the exception of the extreme West. All retailers, regardless of what line or of merchandise they handle, report that they are carrying a large amount of slow-pay consumer accounts. This is especially noticeable in the case of the dealer in automotive supplies and equipment and the repairer as well.

The slow-paying consumer is helping materially to block the wheels of prog-

ress. He must be made to see the light. If he isn't willing to listen to reason and accept the treatment accorded a gentleman, most stringent measures must be adopted. It won't be necessary for the merchant to "go to law" to get his money from the majority of debtors. He won't lose his customer's trade in nine cases out of 10 either.

Before the war debtors could be about equally divided into three classes: Good pay, slow pay and bad pay. At the present time the division is not quite in its former proportion and it is found that the third class, those who are bad pay, is not more than 10 per cent. of the total. This means then that nearly all bills can be collected and the best method yet found to accomplish this is by the use of carefully written collection letters.

Chart Shows Kind of Argument to Use.

GOOD PAY.

Tell Him:

1. Your accounts must be kept straight.
2. You need money for a special purpose.
3. You think he has overlooked the bill.
4. It is a small account, and can't be carried.

SLOW PAY.

Tell Him:

1. You must have remittance at once.
2. You require immediate attention to letter.
3. You are surprised he has paid nothing on account.
4. You may have to take action to effect payment.

BAD PAY.

1. Have personal talk with him.
2. Accept his note.
3. Warn him.
4. Accept time payments.
5. Threaten him, i. e.—
 - a. Bring him into court.
 - b. Call lawyer into case.
 - c. Use collection agency.

Different Letters to Fit Different Cases.

The collection letter should be laid out along definite lines. Certain types are needed to fit each case. The first letter sent should be a "feeler" rather than an actual demand to pay. This will serve two purposes. It will remind the debtor to settle the account, and it will frequently arouse his interest to the extent that he will be willing to make some sort of arrangement that will result in an eventual settlement. The nature of his answer, or the fact that he doesn't answer at all, will serve to show to which of the three classes he belongs, and will give the creditor a line on the kind of follow-up letters to send.

Dear Sir:

I enclose a statement of your account. I realize that you have merely overlooked

it because of the small size of the bill. I understand how easily one forgets these small obligations and that is why I have deferred writing. Your credit hasn't been hurt one bit with me by the incident, but I certainly will appreciate having you slip a check or money order into the enclosed stamped envelope, as I am trying to get a lot of these small accounts cleaned up. Don't bother to write me a letter—just pin your remittance on to this note and drop it into the mail.

Yours truly,

Credit Mgr.

Second Letter Should Arouse Interest and Get Results.

The second letter should be a strong reminder and one that will bring results without offense. The customer's account is still valuable, and care must be taken that he is handled in a manner that will guarantee future patronage.

Second Letter.

Dear Sir:

I have not yet been favored with your check. This has occasioned some surprise on my part. I still believe, however, that you intend to give me the proper attention and consideration due me. You really should have settled this bill two months ago.

It is just possible that you received unsatisfactory goods. If this is the fact I stand ready, and only too willing, to adjust the matter in a satisfactory manner. I have always had a feeling of pride in our business connections, but your present attitude is unfavorable to a continuation of the same relations. Won't you send that check today?

Yours truly,

Credit Mgr.

Making Following Letters More Emphatic.

If the debtor refuses to acknowledge the second letter you are perfectly justified in believing that he is evading the bill. He may write and say that he cannot pay, giving a reason, or he may offer to settle at some future specific date. If he fails to do this you should tell him exactly what to expect as to your treatment of him. Be short and to the point and don't mince matters.

Third Letter.

Dear Sir:

Why are you refusing to do business in a business-like manner? Why are you injuring your credit? If you can't pay your bills why don't you come out and tell me you can't? Despite the fact that my last two letters have gone unanswered, I still refuse to believe that you are willfully ignoring me. You should realize that once your credit is gone, it is gone for all time. Do not allow this letter to remain unanswered. Either send me a money order or check—or tell me why you can't. I'll listen to reason. Let's get this account straightened out.

Yours truly,

Credit Mgr.

It is probable that this third letter will get a reply. If it does not you should make a threat of legal action, although in the writer's opinion it is better to let a bill remain unpaid than to resort to

send two letters—which you have already received, and if no answer is forthcoming, take the matter into court.

That doesn't quite suit me in your case. I really do not want to have you subjected to the embarrassment, publicity and heavy court fees. Therefore I have asked the agency to give me the opportunity of writing you a letter and they have dated your case five days ahead.

This means that you have plenty of time to settle the bill without extra costs. I believe you will do this as much to avoid the unpleasant features of a public trial as anything else. Then, too, you won't want to be blacklisted as a "dead beat." It would hurt you in future transactions.

Just mail me a check or money order marked for my personal attention. I believe you will appreciate this action on my part. In any event you must realize that I am giving you a square deal and cannot be blamed for subsequent happenings. Let's settle this thing and get it out of the way.

Sincerely yours,

Letters to Be Used in Special Cases.

There is an occasional customer who will pay no heed to letters of the style mentioned in the foregoing paragraphs. He has no sense of honor or obligation. He fully understands all about "court proceedings," and they do not worry him. This type of person may frequently be reached through plain ordinary flattery. An appeal to his vanity like the following will do more than a lot of verbal dynamite.

Ninth Letter.

Dear Sir:

I have not yet received your check for the small amount due this firm. I fully realize that you are a big business man and one who has a lot of details to occupy his attention and time. It quite frequently happens that a man of your type doesn't wish to be bothered with petty affairs, and in this case I frankly think that you have been too busy to even give this small matter a thought.

But Mr. ———, as one business man to another, you know how annoying it is to have a lot of these little bills hanging around. You probably are bothered with them yourself. Therefore, if you'll just have your secretary or bookkeeper slip a check or money order into the enclosed stamped envelope we'll greatly appreciate it as we are needing all the money we can get hold of at the present time. Thanks.

Yours sincerely,

There is a class of debtors who are nothing more nor less than "dead beats."

They refuse to pay any and all bills unless they are made to do so. These persons should be handled with "bare hands." They should be made to feel their obligations, as a veiled threat will not penetrate sufficiently to do any good. It is, of course, well to write them two or three of the letters on the list, but if they fail to respond, no time should be lost in fooling with them. The following letter will frequently awaken them to a sense of their duty in the matter:

Tenth Letter.

Dear Sir:

You have refused to answer the letters sent to you. This apparently means that you do not intend to pay this bill. We are through fooling with you. We gave you your money's worth at the start of this transaction. We gave you plenty of time to pay. We sent you three courteous letters, none of which you so much as answered. Now we're going to do something different. We're going to let our lawyers handle the case. You must realize that they can attach your property, your salary, or they can have you summoned into court—and no man wants the publicity and expense of having a judgment declared against him. You have five days in which to settle this bill. This is final. We mean business. Life is too short to fool with debtors who apparently have no intention of settling their honest debts.

Sincerely yours,

Still Another Class of Debtors.

There is still another class of debtors, and their number is truly astonishing, who would much prefer to pay their bills a few dollars at a time than all at once, regardless of how much money they may have on hand.

They seemingly have no desire to deliberately evade the debt. They simply do not like to part with the money in a lump sum. Such people will easily settle their accounts if the merchant will exercise a little tact, although it must be admitted that it is provoking to have to deal with them. A letter similar to the following will frequently result in the dealer getting a few dollars weekly, and the account will eventually settle itself.

Eleventh Letter.

Dear Sir:

We are sorry that you have no apparent desire to settle your account with us. We have written you several letters—three to be exact—and you have not sent us a reply. Now, Mr. ———, we fully appre-

ciate your patronage. We want your trade. You have always expressed yourself as satisfied with goods purchased from us, and we wish to continue friendly relations.

Our usual policy when our letters go unanswered is to give the bill to our attorneys to collect by court procedure. We don't feel that this is necessary under the present conditions. Your credit has always been good. Your bills have been paid. We therefore assume that the reason for your present delay in settling is due to the lack of ready money. Everybody has experienced temporary financial embarrassment. It isn't pleasant. But there's a way out. This is what we want you to do. Send us ——— dollars every week until the bill is settled. It won't bother you, and it will be greatly appreciated by us. See if you can't get in to see me personally Saturday afternoon. I'll be glad to talk with you and incidentally show to you our new line of Amsterdam tires. You'll be interested in them, I think.

Cordially yours,

The merchant, the jobber, the manufacturer—all need cash with which to carry on business. It is a firmly established fact that many a man has grown wealthy through being able to take his discounts as they came. This he could only do by having the necessary money.

Admitting that the merchants in the automotive industry have an unusual number of unpaid bills in their files at the present writing, why isn't it a good plan to start a general clean-up and go after this money? Get it by diplomatic measures if possible, but get it in any event.

It is the merchant's money and he has a right to it. He owes it to himself to make every dollar count in handling the new business, which, coming as it does after a long period of readjustment when money was scarce, means new life to the retailer.

No one thanks a man for loosely extended credit. The merchant who insists on getting that which is rightly his is never criticised. He may lose a few customers. But he'll get them back again. The professional delinquent hasn't much sense of shame and he'll come right back to trade with you regardless of how hard you bear on him. Don't be afraid of losing customers. Just get your money. Customers are easy enough to get. Money isn't.

MAXWELL-CHALMERS PERSONNEL NEWS.

Arthur E. Barker, general sales manager of Maxwell-Chalmers, announces the appointment of H. M. Salisbury as export manager. Mr. Salisbury is a veteran in the automobile export world, having been successfully with the General Motors Export Co as vice president, with the F. B. Stearns Co., New York, as general manager, and with the John H. Willys Export Corp. as assistant sales manager. Additional experience as a financial executive especially qualifies Mr. Salisbury for work in the export field at this time. Mr. Salisbury succeeds H. W. J. Russell, who has been forced to resign because of ill health.

George Pearson, Jr., formerly district supervisor for Maxwell-Chalmers in San Francisco, has resigned to become sales

manager for Union Motors, Inc., a new Los Angeles concern handling the Maxwell car.

The appointment of J. T. Lawson as district supervisor in the Chicago district for Maxwell-Chalmers has been announced. Mr. Lawson's activities in the motor car business have been quite varied, including experience as a field representative of several large companies, branch manager and dealer. His intimate knowledge of motor car merchandising should prove of real value in his work for Maxwell-Chalmers.

Leonard Vandersall, for more than seven years connected with the Maxwell and Chalmers companies, has been appointed South African special representative for the Maxwell-Chalmers export department and sailed for his territory via England on the S. S. Mauretania, May 12. That a man of Vandersall's

seasoned experience was chosen for this post reflects the increasing importance of South Africa as a market for the Maxwell and the Chalmers.

R. C. Reichel, factory service manager for the Chalmers, has been appointed service manager for both Maxwell and Chalmers.

A. E. Richmond, in former charge of Maxwell service at the factory, has been appointed supervisor of the San Francisco district for Maxwell-Chalmers.

E. E. Thompson, formerly chief inspector for Maxwell-Chalmers, has been appointed special sales supervisor for the companies, with temporary headquarters at Detroit.

Theodore Koerner has been named superintendent of inspection, having general charge of inspection in all Maxwell-Chalmers plants.

AMERICAN MOTOR TRUCKS IN TWO SIZES

AERICAN MOTOR TRUCK & TRACTOR CO., Portland, Conn., with offices at 1133 Broadway, at 26th street, New York City, is now in production with three models of trucks each of a different capacity.

The smallest truck is the 2½-ton model, the second a four-ton, and the third model has a carrying capacity of five tons.

At present American trucks are in use in many sections and in many instances fleets composed of from two to 13 are in service and from letters received by the company from the owners the trucks are performing creditably.

American Trucks Powered by Wisconsin Engines.

Wisconsin engines are used in all three models as the source of power and these are equipped with Stromberg carburetor, Eisemann high-tension magneto and facilities for fitting engines with starting and lighting units.

pension, a single point in front and two points in rear of the engine. Side arms, cast integral with the fly wheel housing provide the mounting in the rear and a trunnion bearing cast integral with the timing gear set cover, fitting a bearing in a malleable cross arm fastened at the ends of the trucks and develop better than their rated power on block test. The water jackets are unusually large, providing ample cooling space around the cylinders, combustion chambers, valves, plugs and heads of the cylinders, preventing overheating.

Water circulation is by a centrifugal pump driven from the timing gear set of the engine, while a large G. & O. radiator, mounted in the conventional position, of the fin tube type, surrounded by a cast shell in five sections, bolted together, forms a rigid shell, enclosing the core. In case of damage to the tubes, the shell is easily disassembled, the damaged tube removed and a new tube in-

ward and one reverse are provided, while the gears are of large size and the counter and main shafts are fitted with anti-friction bearings.

The transmission of the four and five-ton trucks is hung amidship and is supported by three-point suspension, two points at the forward end and a single point at the rear. The rear support is in the form of a trunnion bearing, which prevents the weaving motion of the frame from interfering with the alignment of the drive shaft, which transmits the power to the rear axle. The speeds of the transmission for the four and five-ton trucks are similar to that of the 2½-ton model; that is, four speeds forward and one reverse, with all gears in mesh using the cotta transmission.

The propeller shaft of the 2½-ton model is provided with three universal joints and a center bearing supported from a cross member which prevents the whipping of the shaft.

A Thomson full-floating axle is used in the 2½-ton model and a Wisconsin semi-floating axle in the four and five-ton models. The axles are of the worm and worm wheel type, fitted with anti-friction bearings.

Chassis Components Unusually Heavy.

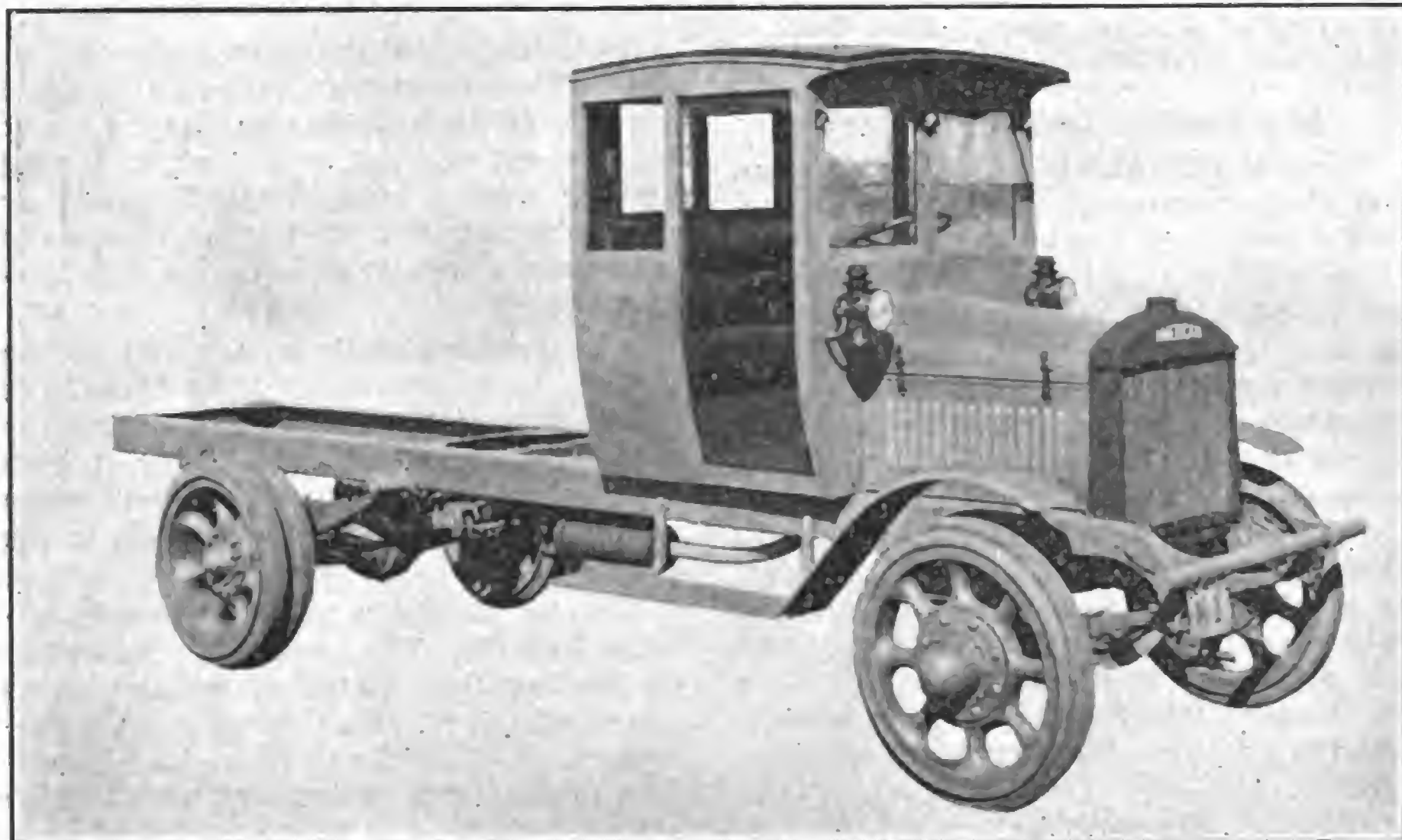
The frame and chassis components are of unusually heavy construction throughout and are built for hard, consistent service. The frame is of pressed steel, with a goose-neck front and is seven inches deep throughout its length. The stock is one-quarter of an inch thick and the frame is reinforced with pressed steel cross members and all joints are hot rivetted.

The springs are made of silico-manganese steel, which is stated to have proved to be the best type of steel so far developed for spring manufacture. The springs are semi-elliptic front and rear and the front springs consist of nine leaves, three inches wide, 42 inches long and 2⅞ inches thick at the center. The rear springs consist of 16 leaves, 3½ inches wide, 55½ inches long and six inches thick at the center. The front end of the springs is double wrapped, which gives double strength for the Hotchkiss drive, which is a feature of these trucks.

Special hangers are provided, which are constructed unusually heavy to accommodate the Hotchkiss drive, and this coupled with the heavy springs offers a solution of the successful use of the Hotchkiss drive for haulage over rough and uneven roads.

The steering gear is of Levine manufacture, situated on the left side of the car and working through a worm and gear to the steering sector arm, which transmits the motion of the wheel through linkage and a tie rod to the front wheels. The spark and throttle controls are located on a quadrant under the steering wheel, while a choker pull button is in the dash for priming the engine with raw gasoline for starting.

The brake linkage is of the usual type, fitted with equalizers, which allow an



Five-Ton American Truck Chassis and Cab Equipped with Steel Wheels.

Wisconsin engines have recently been described in these columns, so that an exhaustive description is not necessary. They are of the four-cycle, four-cylinder, L-head type, fitted with removable head and having the cylinders cast en bloc. The crank case is divided into upper and lower sections. The upper section is fitted with cast webs inside, which support the main journals and the oil pump, camshaft, etc., while the lower section, which is bolted to the upper by steel alloy stud bolts, contains the oil reservoir and oil pump. Brackets are fitted to the outside of the upper case, which support the magneto and water pump and a forward extension of the case forms the timing gear set case, while a bracket mounted at the top of the forward extension supports the belt-driven fan.

Power Plants of Other Sizes.

The engine of the 2½-ton truck has a four-inch bore and six-inch stroke and, of the four and five-ton trucks, 4½-inch bore and six-inch stroke. The engine is mounted in the frame on three-point sus-

serted in its place in the unit.

Lubrication of the engine is by pressure, the oil being supplied from a reservoir in the lower part of the crank case and forced through ducts cast in the cam shaft and timing gear set, the oil crank case leading to the main journals, passing into drilled oilways in the crank shaft, oiling the connecting rod bearings and thrown off by the centrifugal motion of the bearings, forming a mist, which lubricates the valve mechanism, pistons, walls of the cylinders and the wrist pin bearings.

Wisconsin engines used in American trucks are equipped with a special type of governor, which is of the company's own manufacture and governs the engine at a reasonable road speed for the size of the truck.

A Detroit dry-plate clutch is used in all models. This is located in the fly wheel housing. The transmission of the 2½-ton truck is in a unit with the power plant and is of the cotta type, having the gears always in mesh. Four speeds for-

equal pressure to be placed on the brake shoes when applying the brakes. Removing the brake assembly is easily accomplished by taking off the spring bolt fastened hangers at each end of the brake levers in the side members of the frame.

The rear axle is a Wisconsin worm and worm gear type in the larger trucks and may be easily disassembled by removing the worm from the axle housing.

The brakes consist of two sets, emergency and service, mounted on the rear wheel drums and are of the internal expanding type, 2½ inches wide, acting on a 17½-inch drum.

Steel wheels of Smith make are used on all models, front and rear, as regular equipment, the 2½-ton truck being equipped with solid tires, 36 by four-inch front and rear, or pneumatics optional as desired. The four-ton model is equipped with 36 by five-inch single solid tires front and 36 by five duals rear, and the

for the driver's receipt book and shipping papers is located at one side of the seat.

The loading space back of the driver's seat in the 2½ and four-ton models is given as 142 inches and in the five-ton as 158 inches.

The regular equipment includes a hand-operated warning signal, oil can, five-ton jack, steel tool box and set of mechanic's drop-forged tools, license holders, front and rear, and a 2¾-inch round steel bumper. The electric equipment consists of electric head lights fitted with no-glare lenses, and tail light, generator and special truck battery.

The lubrication of the slow-moving bearings is accomplished by means of elbow oilers, no grease cups being used except on the axles.

INTERNATIONAL MOTOR BUSINESS.

A recent statement of the International Motor Co., New York City, states that

which, owing to the depression prevailing throughout the country and especially in the truck industry, is meeting the same difficulties.

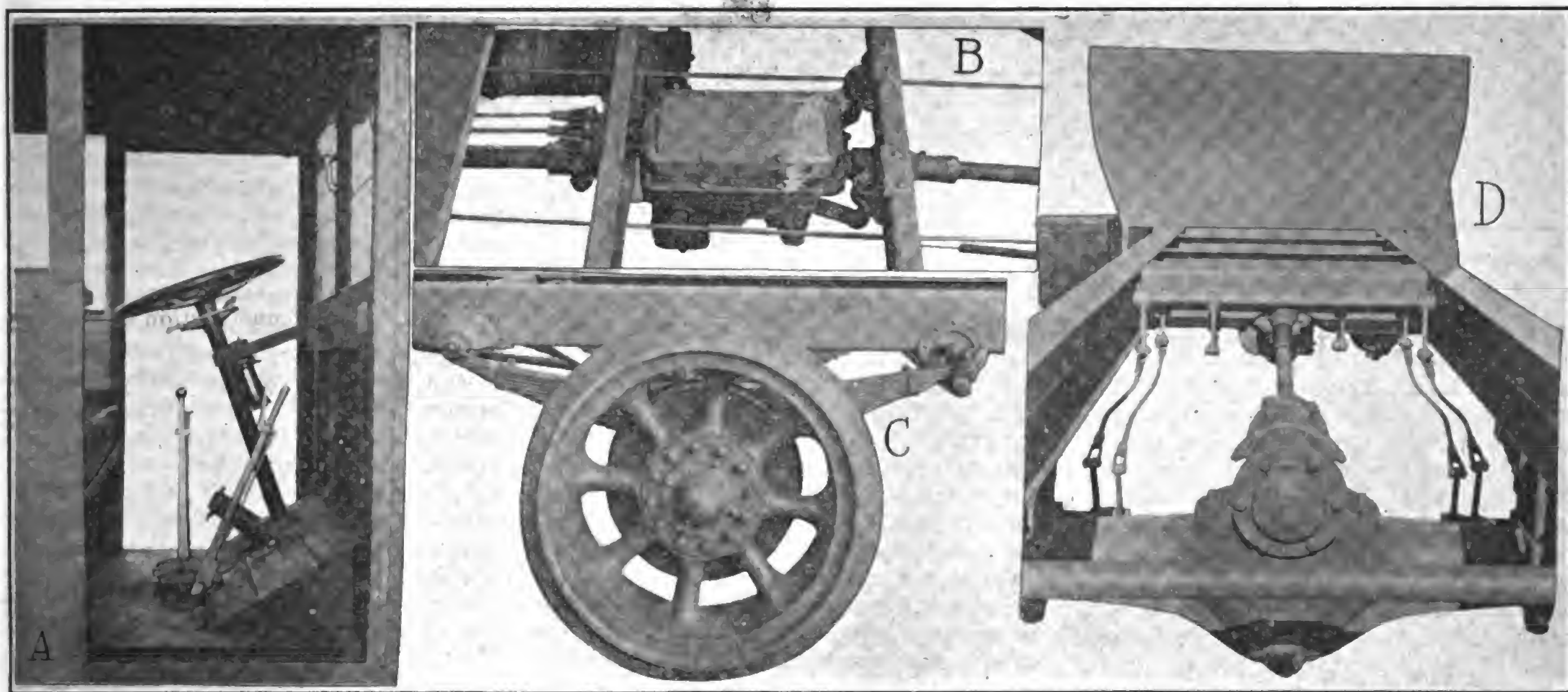
Business will be conducted by the receiver under the same methods as heretofore and the service and prices will be in no way interrupted.

The receiver believes that the business of the company is in excellent shape and that a year's time will find it one of the strongest in the automotive industry.

OFFERS \$100 FOR A NAME.

In need of a new and larger factory, the New Owatonna Manufacturing Co. plans to move to Winona, Minn., this summer and this fact will necessitate a change in the name of its products, which have been known as the "Owatonna."

"The ordinary procedure," says R. H. Proctor, secretary of the company,



American Truck Units Built for Service: A, Interior of Cab Showing Control Units; B, Transmission Hung Amidship; C, Large Springs, Brackets and Shackles Feature Hotchkiss Drive; D, Rear View of American Truck Chassis Featuring Unusually Large Wisconsin Worm-Driven Axle and Brake Linkage.

five-ton model with 36 by five-inch single solids front and 36 by five-inch dual solids rear.

The wheelbase of the 2½-ton truck is 58 inches and the gear ratio on the final drive is 8 2/3 to one, the tread being 58 inches front and 59½ inches rear. The wheelbase of the four-ton truck is 158 inches; gear ratio, standard, 10 to one, tread, 65 inches front, 60 inches rear. The wheelbase of the five-ton truck is 174 inches; gear ratio, standard, 10 to one; tread, 65 inches front, 60 inches rear.

The speed is controlled on the 2½-ton model by an automatic type of governor to 18 miles an hour; on the four and five-ton models to 15 miles an hour.

Each model is regularly equipped with a fully enclosed three-passenger cab made of sheet steel, fitted with sliding windows and doors having spring steel frames. The cushions and lazy back are deeply upholstered and the windshield is divided into two sections while a pocket

trucks invoiced to customers since January are in excess of 2400, or 70 per cent. of business in 1919. The net current assets are in excess of \$20,000,000, cash is over \$3,500,000, while notes and accounts receivable are in excess of \$5,000,000. It is also stated that inventories have been reduced more than \$3,000,000 since January and will be reduced still more during the next six months.

RECEIVER FOR UNITED AUTOMOTIVE BODY CO.

On July 1, T. D. Lamb, attorney, of Cleveland, O., was, with the consent of the United Automotive Body Co., appointed receiver for said company. Such action was considered advisable in order to temporarily relieve any embarrassment which might operate to the detriment of United service to truck dealers.

It is stated by F. O. Darling, president, that the policy of his company is based on very small profits and large volume,

"would be to adopt a new name and announce it to the trade, but we believe it is better to allow the dealers and clerks who are going to sell these machines to suggest the name for them. Our plan is to give \$100 to the dealer or clerk who submits a name that will be acceptable to our board of directors, who will act as judges in the matter. Their selection will be impartial and what we are interested in first and last is to get the most practical, most simple and most easily remembered name for our drills and other machinery."

ADDITION TO SOSS MANUFACTURING CO.

The Soss Manufacturing Co. of Brooklyn, N. Y., manufacturer of Soss automobile hardware, recently completed an addition to its factory, now giving an area of 150 by 200 feet. The factory is a modern three-story brick building and the up-to-date machinery is installed.

DUMP BODIES WITH HYDRAULIC HOISTS

ROAD construction, coal delivery and many other kindred uses demand a dumping body to handle the load with economy and dispatch. This condition has brought about the use of the end-dump body and many varieties of

hand from the driver's cab, brings into service the power of the engine clutch and propeller shaft to the oil pump of the hoist.

Control Levers in Driver's Cab.
The control for operating the hoist by

rear to the side members and the end of the members are cut diagonally to allow the body to reach its 45-degree angle.

The Horizontal Hydraulic Hoist Co., 31-37 25th street, Milwaukee, Wis., states that the Horizontal Hydraulic Hoist which it manufactures, as explained above, is suitable for mounting on practically any make of standard truck, and gives the dimensions and full instructions for mounting with each unit.

Popular Equipment with Standard Truck Companies.

At present, the company states, it is supplying the complete requirements of the Pierce-Arrow Motor Car Co. for dumping equipment on its new line of trucks. Other companies using this equipment include the Packard Motor Car Co., Sterling Motor Co., Transport Truck Co., Republic Motor Truck Co.

The Horizontal Hydraulic Hoist is made in three models as follows: B for 1½-2½-ton trucks; C. for 2½-3½-ton trucks and D for 5-7½-ton trucks. Four standard models of steel bodies are also supplied by the company as follows: HH-1 "All-Purpose" having removable sides and double-acting tail gate; HH-2, having round corners and flaring sides; HH-3, which has square corners and straight sides, and HH-4 with square corners and flaring sides.

The production notes of the company state that the plant is running full time. An improvement has been noted by this concern in the truck field, as evidenced by orders which have been received recently. This is no doubt due to the large amount of road construction work under way and the heavy demand for dumping bodies and hoists especially designed for this class of work.

INDIANA MOTOR TRUCKS IN TRANSPORTATION SERVICE.

The McKeown Transportation Co. is one of the largest general hauling contract companies in the city of Chicago, Ill., and has been growing very rapidly during the past few years. Beginning a few years ago with some light trucks, it has built up a fleet and now owns some 20 or 25 trucks, 14 of which are Indians.

F. M. Ross, Colorado representative of the Oliver Chilled Plow Works for several years, has been appointed manager of the branch at Portland, Ore.



Model "D" Horizontal Hydraulic Hoist Type H H H-4 Body Mounted on Five-Ton Pierce-Arrow Chassis.

hoists, both hand and power operated, have been devised by manufacturers to dump the load. The power-operated hydraulic hoist, consisting of a stand pipe fastened to the cross members of the chassis in the rear of the seat, positioned vertically and having guide pulleys fastened at the upper ends through which pass steel cables fastened to the hoist cylinder at one end and an extension from the body at the opposite end, for a long time has been considered standard equipment for motor truck dumping bodies. This type of equipment is still in general use by many trucking concerns and performs its work satisfactorily.

The hand-operated hoist was probably the first to enter the field and this equipment is still in use on many small capacity trucks where it is impractical to install the more expensive power operated hydraulic hoist.

The chief objection that has been raised in connection to the vertical hydraulic hoist is that it occupies space on the chassis which ought to be utilized for pay load. With the advent of the short wheelbase chassis, developed principally for road contractors, this feature became a large item and proved a problem which manufacturers wished to eliminate. Several devices are at present on the market, made mostly by dump body manufacturers, which eliminate the vertical hydraulic hoist, replacing it with a horizontal type, which is located under the body, between the side members of the chassis, is simple to install and easily operated by either the power take-off of the transmission or by a simple chain and sprocket drive from the propeller shaft. A special connection, operated by

power take-off from the transmission is also located in the driver's cab and consists of levers which give three positions on a quadrant as follows, lowering, holding and raising. Placing the lever on the desired position and connecting the power take-off with the engine operates the oil pump of the hoist according to the position of the lever. By moving the lever to the holding position, which stops the pump from operating, the body may be held in a raised position at any desired point. Starting the pump again by moving the lever to raising causes the body to continue to its dumping limit, which is 45 degrees.

The hydraulic hoist consists of a cylinder filled with oil at the factory, a power-operated pump which circulates the oil, two side arms which raise the body, and are attached to a special lifting device fastened to the chassis cross members, and is actuated by the hydraulic cylinder plunger, and two rollers attached to the under side of the body mounting, over which the lifting arms travel while raising the body from the horizontal to an inclined position. The dumping body mounting is hinged at the



Indiana Truck Fleet Owned by McKeon Transportation Co., Chicago, Ill.

NEW ARCHER POWER HOIST AND STEEL BODY

ARCHER IRON WORKS, 34th place and Western avenue, Chicago, Ill., announces that it is now in production with its new power hoist which has been especially designed for use with steel dump bodies. The hoist can be fitted to any truck having a transmission equipped with power take-off attachment and may be used with other types of bodies intended for dumping the load at the rear of the truck.

The Archer power hoist is simple in construction and operates very easily, as there are few parts and the possibility of breakage or getting out of order has been reduced to a minimum. The hoist is positive in action and quickly raises the load to the required height without the necessity of racing the engine. The power of the engine is greatly multiplied through the transmission gearing, and the heaviest loads are raised with ease. All parts are made of steel and of such size and strength that there is the widest margin of safety.

An additional feature of the Archer power hoist is that the load can be stopped at any desired point and the hoist locked even with the body fully loaded. No particular attention is required to keep the hoist in proper working condition, except to keep the bearings and joints properly oiled, and claim is made that owners of trucks equipped with this hoist will find that it will work as satisfactorily at the end of a year as when it is first installed.

Hand hoists were previously made by this company and are still manufactured and carried in stock for those who wish this type. The mechanism is very simple and the hoist raises and dumps the loaded truck with an ease that is very pleasing to owners of trucks equipped with this device.

In the handling of coal, gravel, aggregate and other material carried in bulk,



White Five-Ton Truck Operated by Elk Milling & Produce Co., Charleston, W. Va.

the use of either a hand or power-operated hoist is almost a necessity if owners wish to get the utmost service from their trucks, and save time and labor.

Ancher power hoists are made in two sizes, heavy and light, and are mechanically operated by means of two levers. The power is taken from the transmission of the truck at the power take-off and is transmitted to an I-beam ram through coil chains, which raises the hoist. Every part is made of steel and the action of the hoist is under the control of the driver at all times through the use of two levers located directly back of the driver's seat. The price of the heavy-duty hoist for trucks of $3\frac{1}{2}$ to seven-ton capacity is \$375 and of the light-duty hoist, for trucks of one to $3\frac{1}{2}$ -

ton capacity, \$340. These prices include furnishing the take-off so that the hoist can be readily attached to any make of truck.

Archer Steel Dump Bodies.

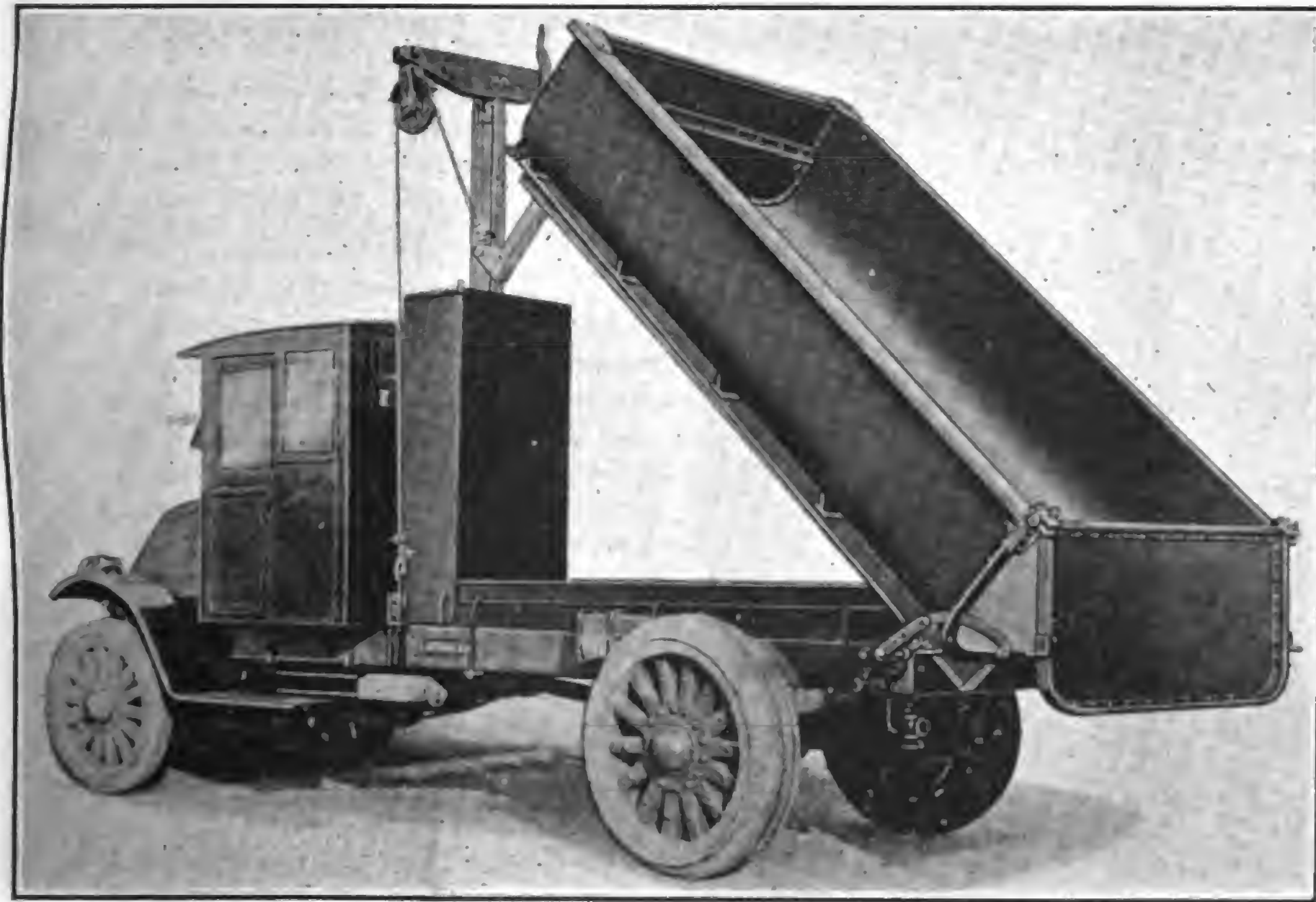
Archer steel bodies are supported by I-beam bolsters and heavy steel structural sub-frames which extend to the end of the body. Other features include a double-acting tail gate and an automatic latching device.

Archer steel dump bodies are made in two sizes, known as models 44 and 33. Model 44 body is constructed of $\frac{3}{16}$ -inch steel plate, supported by I-beam bolsters and two long beams running lengthwise of the body. The corners of the body are rounded, fitted with straight sides, with the top edges flanged down to effectively strengthen them, formed cold and riveted down the middle. The body is absolutely smooth inside and is fitted with a double-acting tail gate and an automatic latching device.

The model 33 dumping body is designed for hauling where the requirements do not demand an extra heavy type, and should be used only with a light power hoist. The body is strongly constructed of steel with square corners and straight sides with the top edges flanged down. Removable wooden flare boards are furnished with this body, increasing its capacity for certain types of haulage service. The body is equipped with a double-acting tail gate and a channel steel frame extends to the end of the body, giving it a solid support.

EMERSON-BRANTINGHAM MOVES EXPORT OFFICES.

The export offices of the Emerson-Brantingham Implement Co. have recently been removed from the Grand Central Palace, New York City, to the Hudson Terminal building, 50 Church street. D. A. Anderson is manager.



Archer Body and Power Hoist Mounted on International Harvester Chassis, with Steel Dump Body at Extreme Dumping Angle.

CORRECT LOAD DISTRIBUTION PROLONGS LIFE OF TRUCK

A PROBLEM which confronts a great number of motor truck buyers is that of purchasing a vehicle which will safely carry their merchandise under all conditions of road travel. Loads vary in their nature and transportation companies are often called upon to haul freight which overhangs the end of the body causing the truck to tip up on the front end. The Packard Motor Car Co., Detroit, Mich., has developed in its engineering department a table showing the proper method of figuring load distribution for short and long wheelbase trucks, thus determining how the truck should be loaded to obtain the best results.

Analysis by trained transportation specialists has proven time and time again that the scientific application of transportation engineering principles has made it possible to greatly increase the efficiency of the hauling in question and at the same time cut down the cost by thousands of dollars a year.

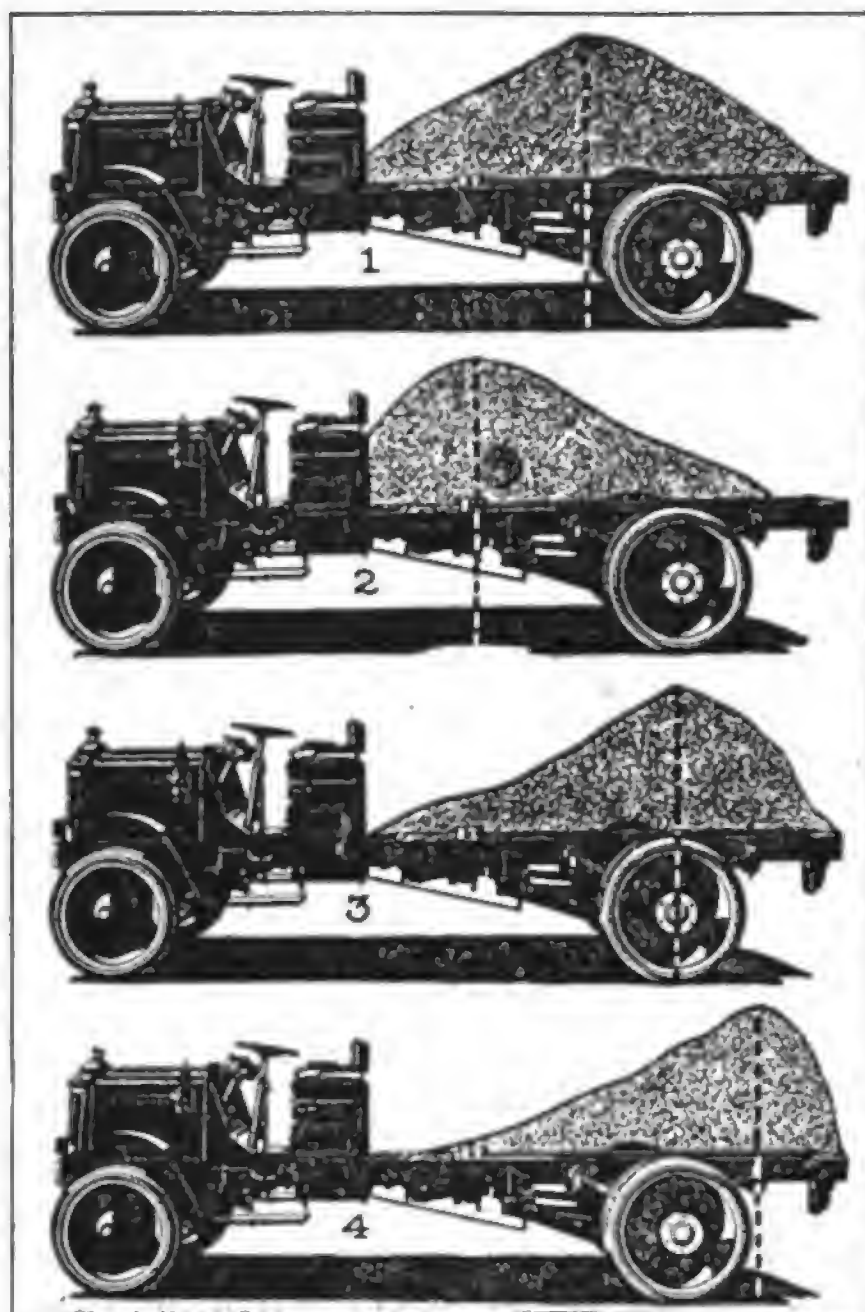
Placing the load properly upon the body of a motor truck is only one of the various phases of truck transportation that should be considered on an engineering basis. Dealing with the distribution of the load on the truck body it will be presumed that an analysis has already proved that the capacity of the truck is suited to the work to be done.

Means Lower Repair Bills.

Therefore, having decided upon the requisite truck capacity, the truck user must next see to it that his loads are placed properly upon the truck body so that each axle will bear its proper share of the load. In most trucks from 85 to 90 per cent. of the load should be borne by the rear axle. Neglect of this requisite means increased tire costs and added frame stresses, which tend to increase repair bills, as well as to shorten the life of the truck.

The center of gravity of a load will be

considered as that point where there is the greatest concentration of weight. In actual practise it is necessary to determine visually the center of gravity of irregular loads; but with regular loads



Proper and Improper Load Distribution:
1, When Center of Gravity Is Located, as Shown, Each Axle Carries Its Share of Load; 2, Front Axle Carries Most of Load; 3, Rear Axle Carries Most of Load; 4, Center of Gravity Behind Rear Axle Causing Lifting Effect on Front Axle with Corresponding Increase of Weight in Rear Axle.

such as lumber, pipe, or oil in tanks, the center of gravity may be determined by simple measurements.

Having determined the size of truck which will best perform a given work, it is essential that correct wheelbase, frame lengths and body dimensions be speci-

fied. The proper location for the center of gravity of a load is determined at the point where about 85 to 90 per cent. of the load will rest on the rear axle. Adherence to this rule will mean consistent performance and maximum truck life. This point is illustrated in Figure 1, where each axle carries its share of the load.

If the load is concentrated at a point near the driver's seat, as shown in Figure 2, the front axle will carry more than its share.

If the center of gravity of the load is directly over the rear axle, as shown in Figure 3, the entire weight of the load will be carried on the rear axle.

If the center of gravity of the load is at a point back of the rear axle, as shown in Figure 4, a lifting effect is exerted on the front axle. It is quite possible to so place three tons on a truck that the rear axle will be forced to carry $3\frac{1}{2}$ tons.

The Reason Explained.

Suppose a load of 6000 pounds is placed on a size ED Packard truck so that the center of gravity is two feet in front of the rear axle. Then, as shown by Chart No. 1, 87 per cent. of the load, or 5220 pounds, will be carried by the rear axle. The remainder, 13 per cent., or 780 pounds, will be carried by the front axle.

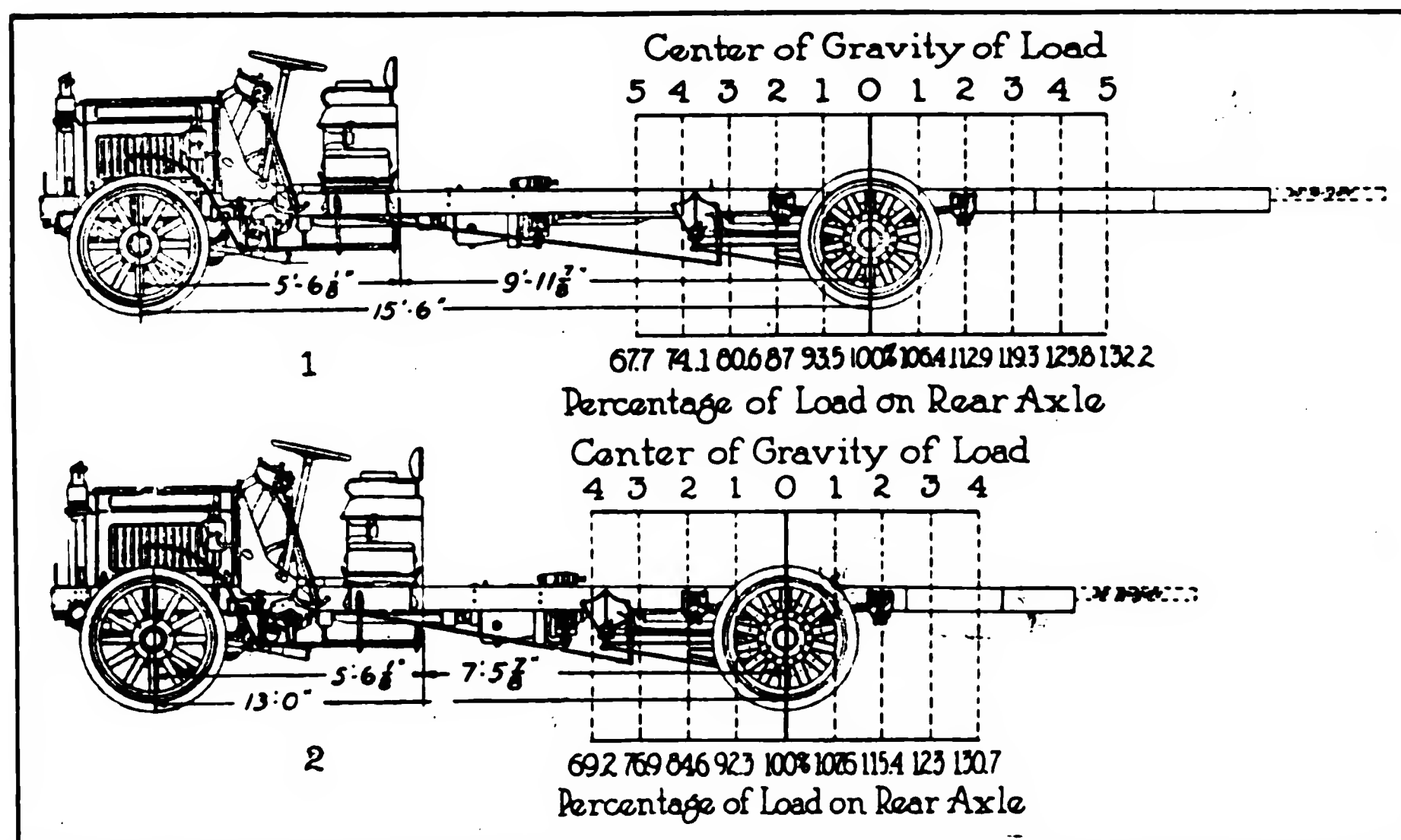
Suppose a load of 6000 pounds is placed on a size ED truck so that the center of gravity falls two feet behind the rear axle. Then the frame acts as a lever, the rear axle acts as a fulcrum, and a lifting force is exerted on the front end of the truck. From the chart, it will be noted that 112.9 per cent. of the load, or 6774 pounds, will rest on the rear axle. A lifting force of 12.6 per cent. of the load, or 774 pounds, will be applied to the front axle. The first of the above instances is graphically illustrated by Figure 1; the second by Figure 2.

The Packard transportation engineering department was recently asked: "Do you recommend a long or short wheelbase for a size ED truck which is to handle 6000 pounds of 16 foot lumber?"

Determining the Answer.

By reference to Chart No. 1 it may be noted that the distance from the driver's seat to the rear axle is about 10 feet. It can safely be assumed that the center of gravity of a load of 16-foot lumber is at a point eight feet from either end. Therefore, if this load is placed on a long wheelbase truck, the center of gravity will be at a point eight feet back of the driver's seat, or about two feet in front of the rear axle. In this case (see chart) 87 per cent. of the load would rest on the rear axle, which is about the right proportion, and therefore the long wheelbase was recommended.

If 16-foot lumber were placed on a short wheelbase, size ED truck, the center of gravity would be six inches back of the rear axle. According to Chart No.



Charts 1 and 2, Showing Centers of Gravity and Percentage of Load Carried on Rear Axle of Long and Short Wheelbase Trucks.

2 this would throw 102.8 per cent. of the load on the rear axle.

Suppose a load of 6000 pounds is placed on a size ED truck, and the center of gravity is directly over the rear axle. Then, as shown in Figure 2, 100 per cent. of the load, or 6000 pounds, will be carried by the rear axle. If the center of gravity is two feet in front of the rear axle, then 86.4 per cent. of the load, or 5076 pounds will be carried by the rear axle. The remaining 15.4 per cent., or 924 pounds, will be carried by the front axle.

Suppose a load of 6000 pounds is placed on a size ED truck so that the center of gravity is two feet behind the rear axle. The frame is then a lever, the rear axle serves as a fulcrum, and a lifting force of 15.4 per cent., or 924 pounds (see chart) is exerted on the front axle. The rear axle will bear 115.4 per cent. of the load, or 6924 pounds. It is quite possible, by improper loading, to exert such a lifting force on the front axle as to cause the front wheels to leave the ground.

The tail gate of a motor truck is frequently used to increase the actual body length. It is at once obvious that this practise will interfere with the distribution of the load on each axle.

Let it be supposed that a truck user in the retail grocery business has a size ED, 13-foot truck with a 13-foot, six-inch body, equipped with a 30-inch tail gate. When the tail gate is lowered and used as loading space it is obvious that 30 inches, or $2\frac{1}{2}$ feet, are added to the body, increasing the actual length to 16 feet.

Lifting Front Axle.

If this owner loads his groceries at the rear end of the truck in order to facilitate unloading, the center of gravity will probably fall behind the rear axle. Let us assume that he puts a load of 6000 pounds in the truck body, using the tail gate, and that the center of gravity falls at a point one foot behind the rear axle. By referring to Chart No. 2 it will be seen that this will throw a weight of 107.6 per cent., or a total of 6456 pounds, on the rear axle, and that the lifting force of 456 pounds will be exerted on the front axle.

HEIL BODIES POPULAR WITH ROAD CONTRACTORS.

The accompanying illustration shows the mounting department of the Heil Co., Milwaukee, Wis., showing 18 truck chassis waiting to have bodies mounted. Those in the foreground are $2\frac{1}{2}$ -ton Oneida trucks, which are to be equipped with Heil S. S. C. bodies and combination bodies.

The Badger Trucking Co. is now operating 24 Oneida trucks, all of which are equipped with Heil bodies and hoists. The decision to purchase additional Hydro units was based on the experience had with Heil equipment for the past three years. Parker, Sterling, Kissel, Selden and Federal trucks are also shown in the illustration.

The Heil mounting department occupies the entire end of the shop, a space 250 feet long and of sufficient width to

easily manoeuvre a truck. A 10-ton crane is used for placing the body and work can be turned out in a very short time.

The short wheelbase trucks are proving very popular with road contractors, as it enables them to have a small turning radius. In order to use a short wheelbase truck the hoist must be mounted under the body, allowing the body to be placed directly back of the cab, thus giving the proper load distribution, but not too high to prevent the driver from looking out back of the cab. The controls of the hoist are located in the cab, where they are easily accessible.

On these short wheelbase trucks, the Hydro hoist is able to give a dumping angle, it is stated, of 52 degrees, which is sufficient for dumping wet concrete, a feature which makes it very popular.

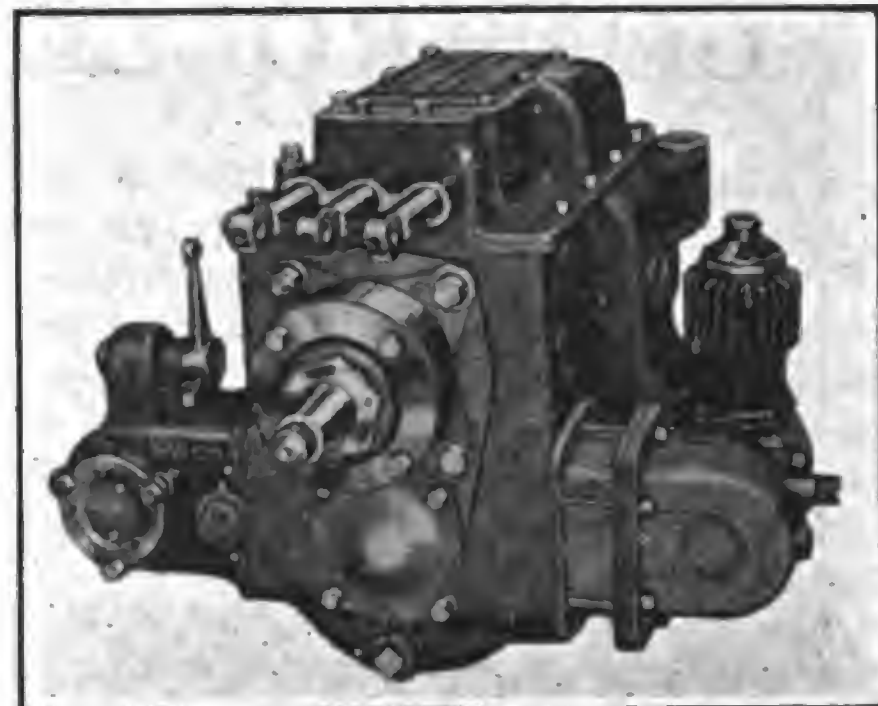
Heil bodies are furnished with mix partitions, enabling the truck to handle several batches of the wet concrete at one load.

WARNER GEAR BRINGS OUT NEW 5-7½-TON TRUCK TRANSMISSION.

The Warner Gear Co., Muncie, Ind., has just brought out a heavy duty truck transmission of new design for 6 to $7\frac{1}{2}$ -ton capacity trucks.

The new model T62 is a four-speed amidship design, with three-point mounting from cross members of the frame. It is designed throughout to meet the most severe conditions of heavy truck service. The speed reductions have purposely been placed as low as possible to give additional truck ability. First speed reduction is 5.849 to 1; Second—3.226 to 1; Third—1.752 to 1; Fourth is direct.

All gears and shafts are of alloy steel. Gear faces vary in width from $1\frac{1}{8}$ " in the heavily loaded reduction to $1\frac{1}{4}$ " in the constant mesh. The countershaft low speed gear is integral with the shaft. In all cases where necessary, "through" shifts are made by the sliding gears to give all available working surface of the



New Warner Four-Speed Transmission, Equipped with Power Pump and Power Take-Off.

tooth face.

Annular bearing mountings are used throughout except for the main shaft and pilot end which mounts on a long type of Hyatt. The oil fling type of oil retainer is used at the main shaft rear, instead of packing, thus avoiding necessity of re-packing.

No fore and aft thrusts are taken through the gear box, as bearings at the front and rear respectively take all thrusts.

The housing is of cast iron and oil filler plug, tire pump mounting opening and power take off openings are provided.

The total weight is 260 pounds.

OLD TIMERS' MEMBERSHIP BUTTONS.

Membership buttons in the Old Timers' club are now being issued from the office of F. Ed. Spooner, secretary, 420 Book building, Detroit. The new emblem is of solid gold inlaid with hard French blue enamel. The border is bevelled and polished and the letters and numerals are in gold. These buttons are about one-half inch in length and one-quarter inch from top to bottom, and are neat and modest in design.



Interior Mounting Department, the Heil Co., Milwaukee, Wis., Equipped with Hydro Hoist for Quick Placing and Mounting of Heil Bodies.

CONTROLLER FEATURE OF CLYDESDALE

CLYDESDALE MOTOR TRUCK CO., Clyde, O., features in its regular engine equipment a special type of governor or controller, which has been developed by the engineering department after many months of careful experimenting to determine that this was the best device of its kind for Clydesdale truck engines.

The Clydesdale Motor Truck Co., is at the present time, manufacturing six truck models as follows: Three-quarter ton, one-ton, 1½ ton, 2½ ton, 3½ ton and five-ton respectively.

Hercules engines are used in all models, this having proved more than satisfactory to the company engineers. The crank shaft is fitted with five journals instead of the conventional three, and the engine is constructed unusually heavy throughout for hard, consistent service. The engine is of the four-cycle, four-cylinder, vertical type, L-head, having the base cast in two sections, and the cylinders cast en bloc and separate from the upper half of the crank case.

Bosch high-tension magnetos are used in all models to supply the ignition and Zenith carburetors furnish the gas mixture to the cylinders.

The cooling system consists of a centrifugal water pump driven from the timing gear set of the engine, a plain tube radiator in the conventional position and a large fan driven by flat belt from the engine timing gear set.

Governor of Special Design.

The controller is designed especially for this type of engine and is claimed to be entirely different from others in that it governs the flow of gas to the combustion chambers of the cylinders as well as the speed of the engine.

Particular stress is laid upon this method of engine control as it is not necessary for the truck driver to change the position of the throttle after it is once set for a certain speed on the level road. As grades are encountered the governor automatically opens a throttle valve in the intake manifold, admitting a heavier charge of gas and enabling the engine to maintain the same engine speed as on the level. When descending grades the controller cuts off a portion

of the mixture, allowing the engine to run slower or to idle according to the steepness of the descent.

This feature, it is claimed, enables the driver to concentrate his energies on steering the truck while the controller under the hood meets uneven travelling conditions.

The Clydesdale controller is an advanced type of speed governor which operates not only as a maximum speed control, but also regulates all the other speeds of the truck. The purpose of the controller is to relieve the driver of the necessity for constant attention to the hand throttle or foot accelerator in order to operate the truck smoothly and efficiently, and to save the engine and driving mechanism from the harmful strains and abuse which result from careless or unskillful driving.

The Clydesdale controller accomplishes this by automatically regulating the flow of gas to the engine so that the engine operates at any desired speed to give the truck a constant road speed, regardless of load or road conditions. The controller performs this function without any attention whatever from the driver, who is left free to concentrate on other matters in connection with the operation of his vehicle.

This method of governing the engine speed allows the Clydesdale truck to travel steadily uphill or downhill without attention to the throttle.

The statement is made that the man who starts out with a Clydesdale controller-governed truck for the first time is amazed at the ease with which it is controlled in going through the different gears up to the high-speed gear. It is stated to be an entirely new and very pleasing experience to get away from an accelerator whenever the gears are changed and the clutch let in. The controller makes the engine automatically pick up the extra load when the gears are changed to a higher speed and the driver, after getting into high, need only to set the hand throttle lever to give the speed that he wishes.

In regular driving the same condition is true. The truck is able to negotiate all kinds of roads at a uniform speed

without the necessity for the driver giving the engine more gas for hill climbs or heavy going, or less gas for down grades when the truck runs partly or wholly of its own momentum. In each case, it is claimed, the demand of the truck for more power or less power from the engine is automatically and instantly taken care of by the action of the controller in opening or closing the carburetor throttle the proper amount.

The accompanying illustration shows a Clydesdale model 120C five-ton truck, equipped with winch and Sewell cushion wheels, owned by Hans Lochen and Son, 96 Clinton avenue, Milwaukee, Wis., taking on a load consisting of two milling machines weighing about five tons each and hauled about two miles to the Northwestern depot to be loaded on flat cars. The job was handled with a tackle block and single line, one-half day being required to complete the job.

It is such work as this that the Clydesdale controller, familiarly known as "The Driver Under the Hood," proves its efficiency.

SELDEN TRUCK PAYS REGULAR DIVIDEND.

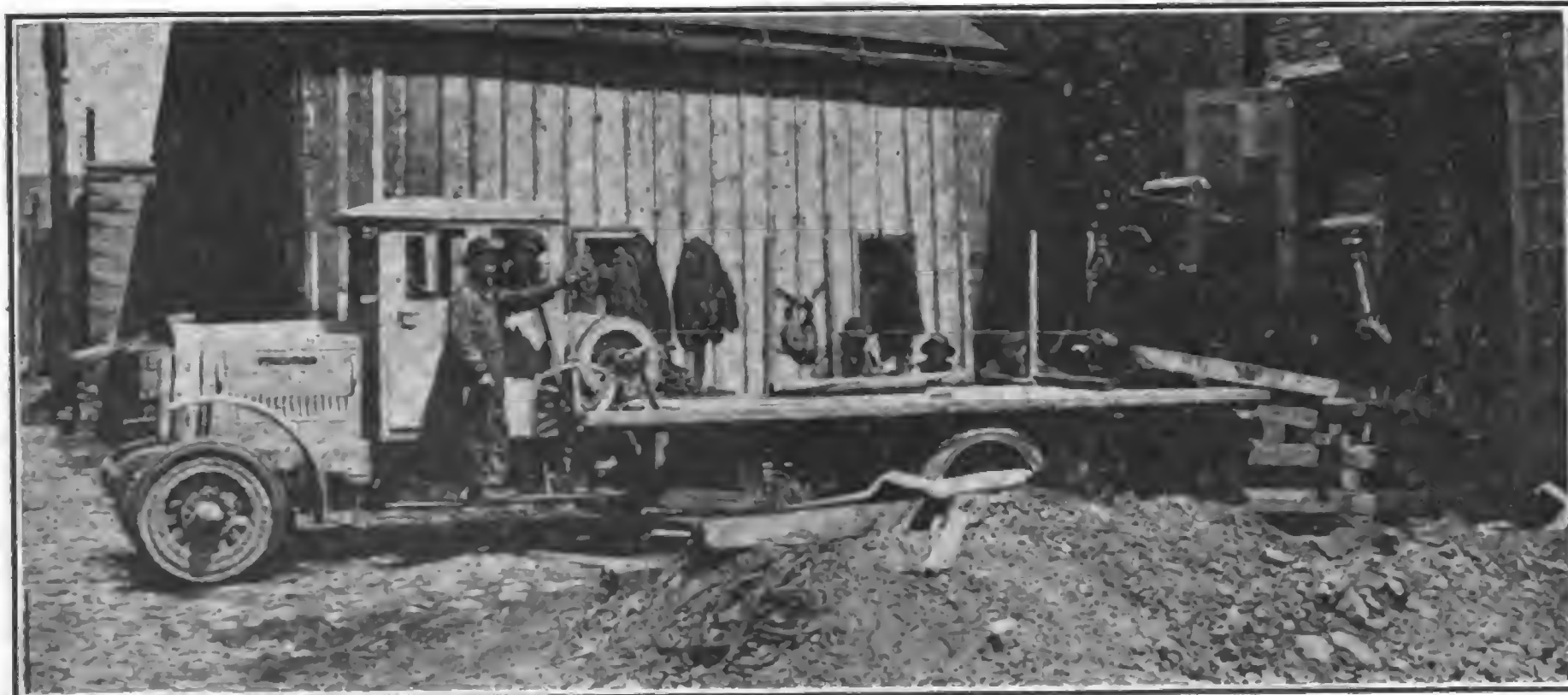
Holders of preferred stock of the Selden Truck Corporation, manufacturer of the "In-Built Quality" motor trucks, Rochester, N. Y., received their regular quarterly dividend check dated July 1.

At the directors' meeting the fact was revealed that while business had not been as good as in the past, still the Selden corporation had succeeded in keeping up the production record to such a high point that the dividends could be authorized. Much of the credit for the success of the corporation must go to the existing policies of manufacture and sales, which consider a quality product and a real service to customer and dealer as first essentials. As a consequence Selden trucks have been sold steadily—many dealers driving away fleets from the factory within the last quarter.

NEW USE FOR MOTOR TRUCKS IN BRAZIL.

By order of the minister of agriculture of Brazil two motor trucks of the type used during the war were recently purchased from France for hauling cattle for the use of the Brazilian Agricultural college. The bodies of the trucks are covered and closed, each having a capacity for four full-grown cows. Satisfactory trials were made in the presence of the minister of agriculture.

Hugh S. Stilwell has joined the Clark-Turner Piston Co., manufacturer of the Deluxe Light Weight Gray Iron Piston, to take charge of and develop its advertising department. Mr. Stilwell has been connected with the Miner Advertising Agency, Los Angeles, Cal.



Model 120 C Clydesdale Fully Equipped with Electric Lights, Sewell Cushion Wheels and Winch, Owned by Hans Lochen & Son, 96 Clinton Avenue, Milwaukee, Wis., Used in Hauling Heavy Machinery.

HOOVER TYPE SC-598 BUS BODY

BUS lines in large cities are proving a popular method of travelling short distances, and their use is increasing rapidly. Companies are, in many instances, already organized and operating bus lines, while many others are contemplating entering the field of passenger transportation.

Among the many companies manufacturing this type of body, the Hoover Wagon Co. of York, Pa., is a specialist and several of its product are now operated as a fleet by the Washington Rapid Transit Co., Washington, D. C. This company is at present operating 18 Hoover bus bodies mounted on two-ton truck chassis. It is stated to be the only transit company which has been able to secure a franchise for operating busses on the streets of Washington.

Designed Especially for Bus Service.

Hoover bus bodies are designed for seating 20 passengers and should be mounted on a chassis having a capacity of two tons. This type of bus body can also be furnished for smaller capacity chassis with consequent less seating capacity.

The materials which enter into the construction of Hoover bus bodies are the best obtainable and they are fitted and assembled by workmen skilled in body building. The frame work is of selected white ash and oak, the outside lower panelling of No. 14 gauge rust-proof auto steel with steel mouldings. The outside main panellings are No. 20 gauge rust-proof auto steel with all iron work hand forged. The upper window sash are fitted with cathedral type glass, while double strength glass is fitted in the lower sash.

The roof covering is No. 10 white sail duck well painted.

The substructure is made especially rigid by a combination of steel and oak. The windows at the sides and rear can be raised and are equipped with brass sash lifts and locks. The vertical stiles of sash are made of metal channels. The front entrance on the right side is equipped with a folding door which is operated from the driver's seat, while the rear end is provided with an emergency door for exit in case of accident. Glass windows are provided in the lower sash at the rear in the front right-hand corner and at the partition in the rear of the driver's seat, which is protected by galvanized steel rods.

All seats, with the exception of the driver's, consist of pressed steel frames fitted with large brass grab handles and are upholstered with canvas-backed rattan equipped with coiled springs. A full width five-passenger rattan seat is fitted at the rear of the body, while the driver's seat is comfortably designed and equipped with a spring cushion and back upholstered with a high-grade of leather fabric.

The lower sash in the windshield is fitted with crystal plate glass and raises and lowers by means of brass sash lifts and locks, while a stationary sash of

cathedral glass is located above the windshield in front of the driver.

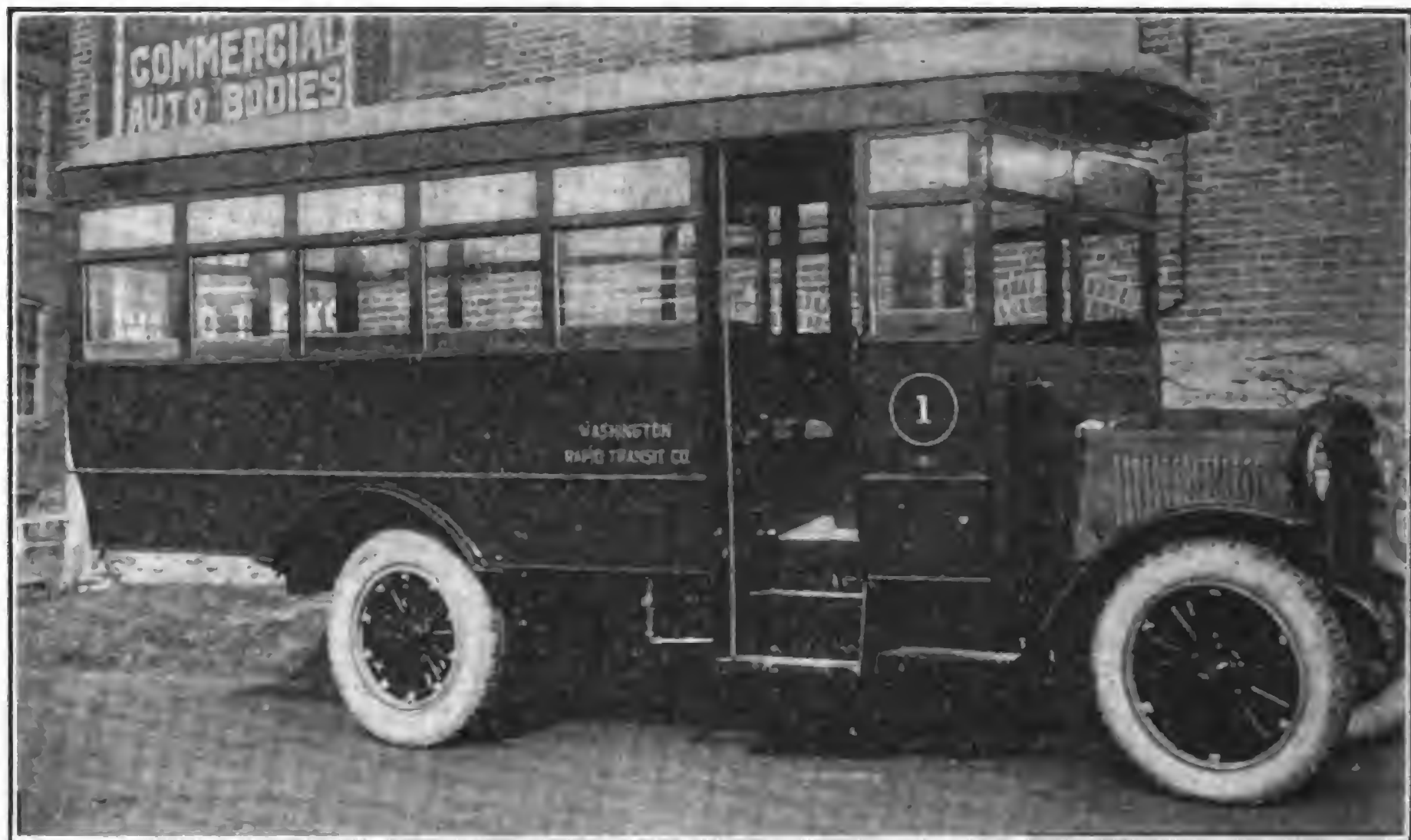
The step at the front end is equipped with ribbed safety treads. A partition is provided directly in the rear of the driver. This is fitted with a stationary window equipped with roller curtain which is operated by spring tension. Two full-length hand rails in the roof in line with the aisle provide additional passenger-carrying facilities, straps attached to the rails allowing the passengers to steady themselves while the bus is in motion. Along the sides of the top are advertising panels, so arranged that placards can be readily inserted. Push buttons are conveniently located on each post between the windows and form connections with a buzzer at the side of the driver. Three dome lights are placed in the roof, while tail lights are located in the lower panel at each side of the rear end of the body. The dome and tail lamps are wired to be connected to the electrical system of the chassis and are

any color to suit the purchaser and is neatly striped to harmonize. The interior is regularly finished in imitation mahogany, and the roof enamelled in white to assist in diffusing the light of the dome lights.

Whenever possible the company asks that it be allowed to mount the body on the chassis at the factory, as it is equipped with special devices for this work, connecting the lighting system, etc.

AUTOMOBILE INDUSTRY HONORS CLIFTON.

In recognition of his 10 years as president of the National Automobile Chamber of Commerce, the members presented to Col. Charles Clifton in his home city, Buffalo, N. Y., on July 13, a painting, "Le Palais Rouge, Venice," by Le Sidaner, as a token of their appreciation of his leadership in the automobile industry.



Hoover Enclosed Bus Body Designed Special for Washington Rapid Transit Co., Washington, D. C.

controlled by independent switches convenient to the driver. A danger signal is placed in the small window in the curve above the emergency door at the rear, which is fitted with a red glass and electric bulb, forming a part of the dome light circuit.

Provision for heating is made by a system of pipes passing at full length on each side of the body under the seats and connected to the exhaust line of the engine. A removable metal disc is placed in the union where the heating system connects with the exhaust pipe and by this simple arrangement the circulation is cut off during the summer months. The floor is covered with heavy linoleum, while slatted ventilators on each side of the body are located near the top. A large tire carrier for an extra tire is suspended from the bottom of the body at the rear.

Finish of the Body.

The exterior of the body is finished in

The presentation at the regular meeting of the directors was made by Alvan Macauley, president of the Packard Motor Car Co. Mr. Macauley spoke of the big part played by Col. Clifton during a progress unparalleled in industry, and of the desire of the membership to commemorate the end of his 10th year in office. He concluded by referring to Col. Clifton as the leader of real cooperative competition in this country.

The committee in charge was: Alvan Macauley (Packard), chairman; A. J. Brosseau (Mack), F. C. Chandler (Chandler), Roy D. Chapin (Hudson), George C. Dickson (National), M. L. Pulcher (Federal), H. H. Rice (Cadillac).

The state treasurer of New South Wales has announced that the government has decided to raise a loan of \$24,000,000 at 5½ per cent., free of taxation, to carry out the reconstruction of main roads throughout the state.

JEWEL BEARINGS FOR SPEEDOMETERS

THE jewel room of the Newark works of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., where the sapphire bearings for high-grade motor vehicle meters are

little plunger presses a piece of tissue paper into the cup. If the grip is sufficiently tight to prevent the paper from being withdrawn without tearing, the cup is passed; but if the paper slips out

passed back and forth all over the inside of the cup, and if the tester feels the slightest elevation or depression in the surface she rejects it.

Finally, each bearing is placed in an instrument called a shadowgraph, where the various surfaces are inspected under an electric lamp, and the distribution of the lights and shadows are carefully noted, and the jewels that pass this test are considered fit for use in an electric meter.

Great Care Exercised in Assembling.

Another illustration of the painstaking care that must be taken in the manufacture of electric meters is given by the construction of the room where the completed parts are assembled.

If these parts were put together in an ordinary room, no matter how clean and well kept, a film of dust would settle on them even if they were exposed to the open air for only a few minutes. To eliminate this dust from the completed instrument the assembly room has been made perfectly dust proof. All of the windows are sealed and air that has been washed and filtered is supplied by a mechanical ventilating system.

But even to remove the dust is not sufficient. Moisture must also be excluded. It is, however, impossible to supply the room with dry air, for such an atmosphere would be intolerable to the workers. A certain amount of moisture must therefore be retained, but it must be prevented from condensing on to the metal parts of the meters, which would happen were the temperature of the room to fall too low. Hence an elaborate system of automatic temperature and moisture control is installed in connection with the ventilating system, so that the air is kept comfortable at all times, but never permitted to become damp.



The Jewel Room, Newark Works, Westinghouse Electric & Manufacturing Co. Industrial Jewellers Examining and Testing Sapphire Bearings.

made, presents an interesting scene of an unusual kind of industrial work to any one fortunate enough to gain admittance. Here, spread out on long tables, are sapphires by the thousands, and scores of girls are engaged in examining them under high-powered microscopes or in deftly testing them with the most delicate instruments.

These jewels are an essential part of a really accurate meter. Cut into the shape of tiny cups they support the axes of the rotary elements of the meter and form bearings that run with almost undetectable friction losses. Also, being very much harder than the metal parts in contact with them, they do not wear perceptibly and therefore do not cause a constantly increasing error in the meter reading.

Only Perfect Stones Chosen.

The first step in the process of making these tiny bearings from the rough gems is to subject each stone to a careful scrutiny and select only those that are perfect. These are then ground into flat plates of the proper thickness and, from these plates, little discs of the correct diameter are made. Each disc is then hollowed out on one side and becomes a minute cup to hold the end of the revolving spindle. After the cup is formed it is carefully polished so as to remove the slightest irregularity.

The thickness and the diameter of the discs are measured by micrometer instruments, but the cutting of the cup must be tested in another way. In this test a small instrument grips the jewel and a

when gently pulled the cup goes back to be recut.

Cups Carefully Tested for Smoothness.

The testing of the smoothness of the interior of the cup can be done only by an expert with a highly developed sense of touch. The point of a fine needle is



The Dust-Proof Room, Where Meters Are Assembled, and Dust and Dampness Are Vigorously Excluded.



"How do you find business?" I asked O. M. Vett as I dropped into an arm chair on his back porch after a hot day spent in the city.

Facetious as usual he chose to take my stereotyped greeting in the literal sense and answered with his usual directness. "I find business by looking for it."

"Good way, too," I laughed, handing over the conventional half-dollar cigar with which all writers are well supplied. "So long as you wish to interpret my bromidic question in your own manner, go ahead and tell me how you get the name on the dotted line under present business conditions. How do you do it? Tell me," I invited.

"It's like this," answered the old salesman, relieving his feet of a load by slipping off his out-size oxfords, preparatory to elevating his number 11's to the piazza rail. "When this reorganization period started to slow up business I just sat down and figured the whole thing out. I made up my mind that the early bird would go hungry if he stopped scratching just because the worm didn't show up at the first crack out of the box. In other words, the truck salesman who allows himself to get discouraged just because he doesn't run into a prospect right off the bat stands a mighty fine chance of doing without his commission checks.

"As I doped it out I just had to keep a scratching—and without going into detail, that's the way I've 'found business.' As a matter of fact," he continued after a moment's thought, "contrary to the usual opinion, business is as good as ever it was, only there isn't as much of it. It's hard to get, and that is what has started the ill-founded rumor that it has gone to the dogs. A real salesman can prove that it's good enough, and I'm one of those who knows it, too," he finished, solicitously rubbing a protuberant bunion with a careful hand.

"And now it's my turn to ask a question," he said, turning to me. "Speaking of a real salesman, just what is the true meaning of the word. You know all the high-brow 'ologies' and 'isms' connected with it, what makes the wheels turn 'round and how the darn thing functions in general. Still, for all your knowledge, I'll bet you can't give me a white man's definition of the word."

I arose to the bait, not without some misgivings based on previous acquaintance.

"A salesman," I declaimed in my best lecture voice, "a salesman—according to the general usage of the word, which, in-

At first glance this picture looks a whole lot like a section of Chesapeake bay during the trap-fishing season. It also suggests a species of water croquet. A retired naval officer, when shown the photograph, decided immediately that it was familiar to him.

"It's a flock of scrapped German submarines," he said. "I remember of seeing them just before we left England—;" but he was wrong.

This picture is an actual unretouched photograph of some 2000 motor trucks, the property of the armies of occupation, and they are submerged by the flooding of the German river, Rhine. Only the tops of the cabs and the tarpaulin bows are visible, the rest being sunk in the

muddy water of the German river, which appears to have wreaked German vengeance on American property—something that no true Prussian would ever have thought of doing—unless he had been able.

It is safe to hazard a guess that these trucks were very near unserviceable after their long immersion. The muddy water seeping into the engine parts would naturally do great damage and it is probable that the electric units would be entirely ruined.

MOTOR TRUCK has very good reason to believe that some of these trucks are being sold for commercial use in the United States by certain so-called "auction houses."



identally, is a common noun, masculine gender, singular number and may be objective or subjective depending on its relation to the verb—a salesman is one who has thoroughly mastered the art of unconsciously impressing on a prospect's subconscious—"

"Hey, look out. You're burning that hash all to thunder," interrupted Vett, grinning at the neat way in which he had succeeded in trapping me. "I knew you didn't know the definition of the word—too high-brow," he laughed. "Now listen to me—the true meaning of the word, as given by the dictionary, is: 'A man who sells goods,' and, believe me, that's the only definition that will be accepted from now on. Think it over and write a few paragraphs about it."

I did and I have.

TRACTOR TO BE MANUFACTURED IN SOUTH.

R. F. Carr, who resigned as assistant general manager of the Frisco system, has organized a \$1,200,000 tractor corporation at Memphis, Tenn. The machinery has been assembled at the Memphis plant and actual work will be started soon.

The tractor to be manufactured by the Carr Corporation is said to contain some improvements over those now at present in use throughout the country. The Carr patent is constructed with extra high wheels with an arch in the middle of the

machine, making it possible to work on the roughest ground. The height of the wheels also makes it possible to work in corn and cotton fields without damage to the crops.

HOLTON TRACTOR TO CHANGE.

The contract for the transfer of the Holton Tractor Co. of Indianapolis to the Kokomo Co., which will take over the tractor company's business, will be effected as soon as Elwood Haynes of the Haynes Automobile Co. returns from New York. Negotiations for the transfer are being carried forward with the receiver in charge. The transaction will involve approximately \$350,000. The Holton Tractor Co. will probably be moved to Kokomo and it is understood that the strong features of a tractor manufactured at Elwood will be combined with the Holton invention. Others interested in the new company besides Haynes are A. G. Seiberling, George J. Marott of Indianapolis, Simeon McQuiston of Greentown and others.

HINES CO. ADOPTS CLIMAX ENGINE.

The Hines Combined Harvester Co. of Hutchinson, Kan., has adopted the Climax model "T" 5½ by seven-inch bore and stroke engine as standard power equipment for its combined harvesters.

Points on Care of Solid Tire Equipment

Here are a number of points on proper upkeep of solid tires which it will pay truck owners to keep in mind. In most instances a solid rubber tire has outlived its usefulness when the rubber is worn down to a point about one inch above the edge of the steel base. This maximum amount of wear is very clearly indicated by the flattening of the tire in different places on the circumference, which produces the same effect on the truck as is caused on a freight car when it has a flat wheel. It frequently pays to remove tires while they still have about one inch of rubber above the edge of the tire base. The practise of many owners in keeping the tires on the wheels until the base separation occurs or the soft rubber is worn off is a most expensive economy, as the increased vibration often produces broken front axles and steering knuckles. The cost of making such repairs is far in excess of the sum saved by running the tires a few hundred miles more.

Flat tires may be caused by imperfections in the tires themselves or by improper care on the part of the truck driver. In the latter instance a too sudden application of the brakes most often produces flats since the rear wheels become locked and slide along the surface of the pavement without revolving in the ordinary manner. This causes an excessive friction at the point of the tire in contact with the ground, with the result that the tire at that point is worn slightly out of round.

Base separation when the tire is not defective may be caused by changing the direction of the truck motion too suddenly while it is travelling at a good rate of speed. Turning the front wheels to a cramped position to get away from the curb while the truck is standing still also produces an excessive side thrust that tends to tear the soft tread rubber away from the hard rubber base.

Other pointers which can be followed with good results in order to obtain greater tire mileage include a strict inspection of the truck loading and a close supervision of the drivers to prevent overspeeding. Overloading and overspeeding are two of the most important causes for rapid tire wear. Both should be avoided to the greatest possible extent and when this is done it will be found that the great majority of any of the reputable makes of tires will give at least the guaranteed mileage and in some cases many more miles than set down in the guaranty.

In most cases it has been found impracticable to fix solid rubber tires by vulcanizing when the tire tread has become cut. Every time a cut in the tire comes in contact with the road, a spreading and tearing action occurs and this soon causes an extension of the cut down to the base and also to the tire. One of the best methods of repairing a cut in a solid tire is to trim out the rubber on both sides of the cut until the cut itself has been entirely removed. Practise has shown that when an attempt is made to vulcanize the two sides of the cut to-

gether that portion of the tire of repairing a cut in a solid tire is to trim around the cut becomes weakened and under action of heavy loads soon breaks away, weakening the tire almost as much as if the cut were neglected.

Another cause for rapid tire wear is improperly adjusted brakes. While even the most careless driver knows that locking the brakes or skidding produces excessive tire wear, he does not realize that skidding often results from improperly adjusted brakes as well as applying the brakes too quickly. Often skidding results from brakes which are improperly adjusted and when one of the brakes locks or binds at regular intervals in the regular revolution of the wheel, even when the full braking pressure on the pedal is not exerted.

Running trucks in car tracks is another source of rapid tire wear, which it will pay to avoid whenever possible.

HESS APPOINTED MANAGER OF FIRESTONE PNEUMATIC SALES.

The appointment of John D. Hess, Jr., as manager of pneumatic tire sales, with headquarters at Akron, O., is announced by the Firestone Tire & Rubber Co. This promotion is in line with the company's policy of filling executive positions from men within the organization, and selecting the men whose experience and training best fit them for the more important posts.

Mr. Hess' advancement with the Firestone Co. is characteristic. Starting nine years ago as salesman at Detroit he has successfully filled the position of branch manager at Cleveland, special representative to truck manufacturers, district manager on the Pacific coast and assistant to the western sales manager.

ANTIGO TO BUILD NEW TRACTOR.

The Antigo Tractor Corporation, Antigo, Wis., expects to complete the first model of a new design of the Antigo Quad-Pull tractor on July 15, and to have the first 10 commercial machines ready for delivery by Aug. 1. Production is being carried on at outside points pending the construction and equipment of permanent works in Antigo during the fall and winter months. Parts are being made in Milwaukee, Fond du Lac and Oshkosh, and assembled at Fond du Lac, under the personal supervision of Herman Freudenberg, general superintendent.

TIMKEN TAKES OVER ADDITIONAL HELP.

C. N. Repogle, general manager of the Columbus branch of the Timken Roller Bearing Co., has increased the force at the plant from 250 to 450 men. He is of the opinion that still further additions to the working force will be necessary.

Without the motor truck horses would cost twice as much as they do today.

FORDSONS TO TOUR STATE OF WASHINGTON.

Definite plans have been perfected for a tractor demonstration tour in the State of Washington, to be started during the month of July. The big project has been arranged and will be carried out by the Ford Motor Co.'s Seattle branch and assembly plant. The tour is expected to last four weeks.

The purpose of the tour is to encourage the use of tractors on the farm. The demonstration trains will comprise 22 tractors, with an outlay of various farm equipment. The tractors will all be rubber tired and the machines will make the entire trip under their own power. In addition to the tractors there will be 18 trailers.

Brake Equipment Necessary.

A feature of the trip will be that every one of the 22 tractors will be equipped with brakes to comply with the state law requiring all vehicles on state highways to be fitted with brakes and rubber tires on the wheels.

The train of tractors hauling the trailers will present more of a circus parade appearance on entering the various towns of its itinerary, for it will be headed by a steam calliope, attracting great attention to the caravan and its units.

The caravan on arriving in a town will form in a semi-circle with a platform in the center. Speakers will talk from this platform and at night educational pictures will be flashed on a screen.

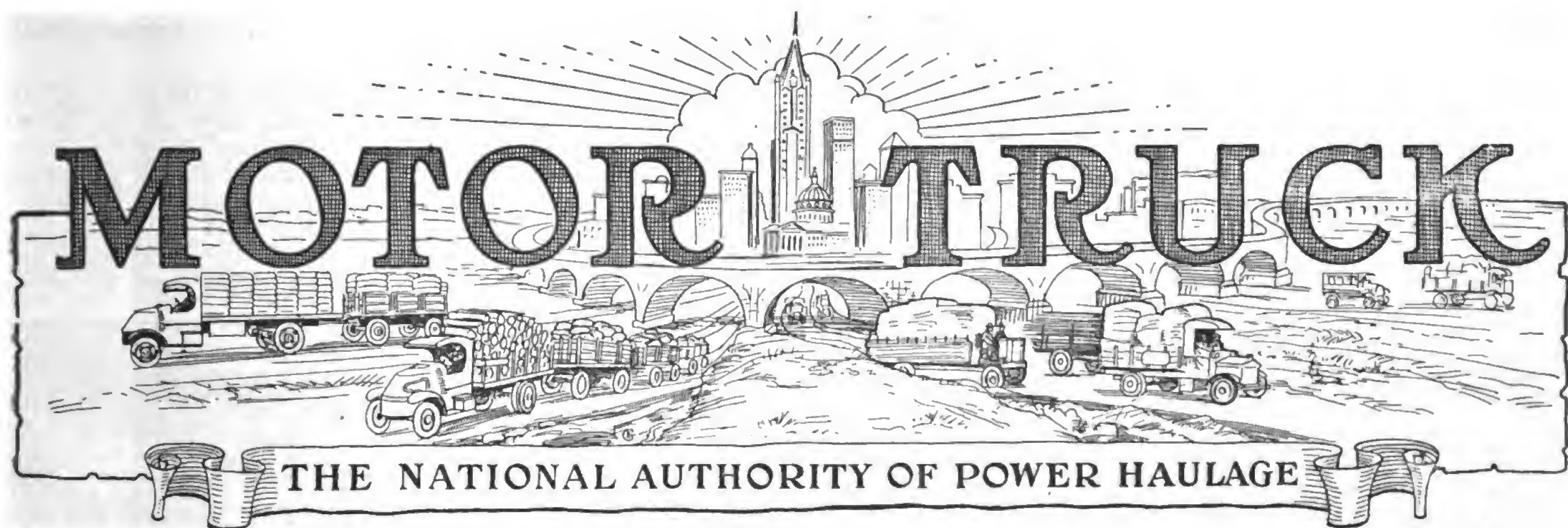
Camp Equipment.

The equipment will include an army rolling kitchen, tents, cots and accommodations for the 35 persons accompanying the tour. The caravan will follow a schedule similar to an army movement, the workers camping at night and eating their meals on the road.

The Ford agency has obtained the services of Lieutenant-Governor W. J. Coyle as executive head of the tour. Mr. Coyle was former secretary of the Automobile Chamber of Commerce of Washington.

NEW ADVERTISING MANAGER FOR ALLIS-CHALMERS.

R. C. Brewsaugh has been appointed advertising manager of the tractor division of the Allis-Chalmers Manufacturing Co., succeeding L. C. Pounds, who becomes assistant to B. M. Seymour, manager of the tractor division. Mr. Brewsaugh is one of the pioneers of the industry, starting as a store keeper with the old Gas Traction Co., and later becoming assistant sales manager. When that company was sold to Emerson-Brantingham he was transferred to the foreign department of the latter company at Rockford. Later he became advertising manager of the Bull Tractor Co., Minneapolis, Minn. He held a number of important positions in the General Ordnance department during the war, joining the J. I. Case Plow Co., at Minneapolis, when released from the service. For the last two years he has been assistant sales manager of the Toro Motor Co.



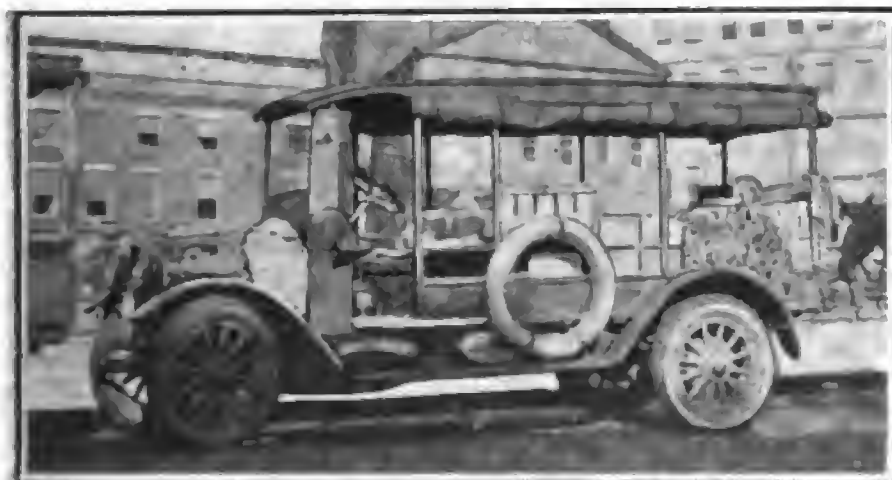
VOL. XII. NO. 8.

PAWTUCKET, R. I.

AUGUST, 1921.

Rhode Island Farmers Praise Motor Truck

CLAIM POWER HAULER SAVES TIME AND MONEY IN CONDUCT OF FARM—IS ONLY PRACTICAL METHOD OF TRANSPORTING PRODUCE TO WHOLESALERS—ALSO USED EXTENSIVELY BY PEDDLERS.



RHODE ISLAND, the smallest state in the Union, supplies a large amount of fresh produce for local as well as outside markets, and has established for itself a record that may be looked upon with envious eyes by other sections of the country. The farmers who raise this vast quantity of truck of various kinds are heavy users of motor trucks, not only in the ordinary farming operations, but in hauling to market. This product is mostly fresh vegetables, fruit, berries, root crops, etc., most of it finding a ready sale through the various marketing agencies in the city of Providence, including the older Providence Market Gardeners' Association and the later formed Providence Farmers' Exchange and the wholesalers. A large amount of produce is sold direct from the trucks to peddlers, who drive into the city during the early morning hours, going from truck to truck, buying corn from this farmer, carrots and tomatoes, etc., from the next, and finishing their loads with southern and western fruits from the wholesalers on Dyer and South Water streets.

Territory Supplying Local Market.

Produce is brought into the city of Providence from a territory including the

State of Rhode Island and sections of southern and eastern Massachusetts. To reach this market in former days, when produce was hauled by horses, it was necessary for the farmer to load his wagon the afternoon of the day before he intended to go to market, drive into town in the evening, staying over night, so as to be on hand early the next morning. Since adopting the truck this order of things has changed. The old method necessitated from 18 to 24 hours away from home to market a load of produce varying according to the distance of the farm from the city. Today, with his motor truck, he is able to start for market around 2 or 3 o'clock in the morning, arriving in the city with sufficient time to spare and after the load is sold, only an hour or two are required to return home, giving him time to do his farm work and

load his truck for a trip to market again the following morning. Formerly a trip every other day was perhaps the best he could manage. Nowadays the truck allows him to go every day, thereby multiplying his profits by two, to say nothing of the additional time allowed for extra work on the farm. This item is of especial advantage when good field hands are as difficult to obtain as they are at present.

Motor trucks are used extensively by farmers near Newport to haul their produce to the wharf for shipment to the wholesalers in Providence, while produce is also shipped to Boston by motor truck. Fall River farmers and those living in the section embraced by the triangular territory between Fall River and Taunton centering at Providence drive to Providence. Other farmers from the Attleboros bring



Two-Ton Gram Truck, Owned by J. W. Peck & Sons, Co., Seekonk, Mass.—This Truck Was a Pioneer in Farm Produce Industry—Good Work It Performed Induced Many Other Farmers to Purchase Trucks.

in produce in motor trucks, while those in the western and southern parts of the state supply a large amount of the general produce received by the market men. Potatoes are raised heavily by farmers in the southern part of the state and where formerly these were shipped by rail they are now hauled by motor truck.



Load of Tomatoes Raised on Farm of J. W. Peck & Sons Co., Seekonk, Mass.—This Was First Load to Be Sent Overland to Boston After the Formation of Farmers' Market.

Excess Produce Shipped Direct to Boston.

At certain times during the season the farmers bring to market larger quantities of produce than can be readily absorbed by the local trade. This excess, often spoiled in the earlier days as no outlet was available, with the advent of the Providence Market Gardeners' association and later of Providence Farmers' Exchange, the latter being an offshoot of the former, was sent over the road to Boston by motor trucks and reshipped to points further North, frequently going by boat to Nova Scotia and New Brunswick. This has proved a boon to the farmers, as produce that was formerly wasted can now be realized on before it spoils. The motor truck has been instrumental in solving this problem as the shipper is notified before leaving the farm just where his load is to be delivered in Boston and the loaded truck goes direct over the road to the purchaser. This has been made possible through the cooperative selling plan adopted by the association named above. A manager is employed on a yearly salary who attends to the selling end, payment for the produce being made to him and he in turn settling with the farmer who is a member of the association.

This method also makes possible the shipment of excess produce to other points by motor truck, as for instance, to New London, New Haven, Bridgeport and New York. Other Connecticut points are within reach of this manager through the use of motor trucks owned by members of the association. Large sums are saved for the members annually which otherwise would be a loss, the commission accruing to the manager going a long way toward paying his salary.

Variety of Crops Raised.

Produce raised in Rhode Island includes practically all crops that may be successfully cultivated in this latitude, including hot house vegetables for early market, such as cucumbers, radishes, lettuce, etc., through the list of summer and winter vegetables which are grown in the open ground, including spinach, lettuce, celery, onions, beets, tomatoes,

cabbage, both early and late. Potatoes are also a factor. Fruits are raised in large quantities, such as apples, pears, peaches, etc., and several growers specialize in apples and are able, through advice given by the Rhode Island Agricultural College at Kingston, R. I., to raise as fine fruit as can be found anywhere. Several growers place their late winter varieties in cold storage and obtain top prices for their products in the winter.

Motor trucks figure in the haulage of this product from the field and to the market or store house and that they are economical is clearly indicated by their increasing use in this branch of the industry.

Among farmers who specialize in vegetable produce may be mentioned J. W. Peck & Sons Co., Seekonk, Mass. At present this concern has about 95 acres under cultivation, mostly in vegetables, including spinach, lettuce, celery, onions, beets, tomatoes, early and late cabbage. A large, high-studded greenhouse 300 feet long and 54 feet wide occupies a central position on this farm and is given over almost entirely to the raising of cucumbers for the early market.

Mr. Peck is a firm believer in this type of green house and states that last spring he was able to supply cucumbers to the Providence market long before his competitors were able to market theirs, this fact being due, he claims, to the type of green house used. The sunlight of early spring was able to reach every part of the house, supplying a greater amount of heat than if the peak and sides had been lower, as in the conventional form of green house.

Mr. Peck is a strong advocate of the use of motor trucks, having driven a Gramm three-tonner during 12 years previous to purchasing the several large machines which he now uses. His success with trucks in hauling produce has been phenomenal, as his repair expense has been very low. He requires his drivers to hold the speed of the truck down to 12 miles an hour under load in the country and

even lower than this in the city. A one-ton Republic is also used for the lighter loads and he does not hesitate to overload by 75 per cent if he has additional produce to carry that makes it necessary.

The two-ton Republics will easily haul 256 bushel boxes of mixed vegetables and as the filled boxes weigh about 30 pounds



Humble Start of the Future Wholesale Produce Dealer. A Speedy Motor Truck Is the Next Step.

on the average, this would make a load close to 7680 pounds.

Methodical Method of Loading.

The two pictures shown are loaded Gramm trucks owned by Mr. Peck and shows the methodical manner of loading. The second picture shows the truck returning from market with empties. This truck, it is stated, hauled the first load of tomatoes from the farm to Boston, Mass. A point which Mr. Peck brings out very strongly is that, although the operating costs are rather heavy, yet when the number of trips that can be made in a day are considered, and that the length of the trip is unlimited, to say nothing of the time gained for home work and the ease of handling the load, the use of a truck in his work gives him a distinct saving at the end of the year and that there is absolutely no comparison between this type of hauling and that performed by horses.

This farm was started on an initial investment of \$600 and as the business in-



Type of Body in Popular Favor Among Truck Farmers and Produce Dealers for Hauling Heavy Loads.

creased additional land was bought until it comprised a large section surrounding the original farm. As the sons grew up and wanted to set up in business for themselves, land was sold to give them their share of the estate. At present around 100 acres are left surrounding the home farm. Farmers of foreign extraction are taking over all available land offered for sale in this section and do not hesitate to pay almost any price asked for good market gardening land. They have the best of success with the growing of vegetables, as every member of the family who possibly can work is in the fields. They are not afraid of long hours and work hard for success. Many have purchased farms and within a few years have paid for them from the produce raised and marketed in Providence. They are also firm believers in the use of power on the farm and nearly all are using motor trucks to do their hauling.

Buy and Sell on Cooperative Basis.

The original Providence Farmers' Exchange and the more recently organized Providence Market Gardeners' associations are managed on a cooperative basis. Members leave their produce with the manager to be sold or, as in the case of the Providence Farmers' Exchange, which is located a short distance outside of the city, farmers hire a stand privilege and sell their produce to peddlers from their trucks. Many members of this association simply pay a stand fee and

possible for them to absorb certain of the surplus products which are not needed for the Providence trade. If it is found that Boston market can use so many tons of tomatoes or cabbage or, in fact, any other product, the members raising the product wanted are notified the quantity that they are to supply, where the loads are to be delivered and the member with his truck immediately proceeds to load the quantity required of him, at night sending the truck over the road, landing the produce in Boston in time for the opening of the markets the next morning. In this way freight and handling charges are saved, and the produce is received in a fresh condition. Produce thus received is very often reshipped either by motor truck or railroad to northern points, often as far north as Nova Scotia.

To bring out a point which worries the regular wholesalers, it is stated that the Providence Market Gardeners' association is not alone a selling association, but purchases from outside sources as well. For instance, one of the largest potato growers of Northern Maine has become interested and is finding an outlet for large quantities of potatoes which he raises, realizing better prices for his products than he otherwise would if marketing through the regular wholesale channels. The credit of the association is considered by outsiders very high, and there is no question but that the motor truck has played an important part in

packing houses of the West maintain branch houses in Providence, while Canal street, the center of this industry, is honeycombed with small local concerns, who buy what their needs require from the larger companies and sell again at



Manner in Which Produce Growers' Trucks Are Loaded, Showing Orderly Distribution of Load.

wholesale to their customers; many of them are small market men in the various cities and towns within driving distance by motor truck from Providence.

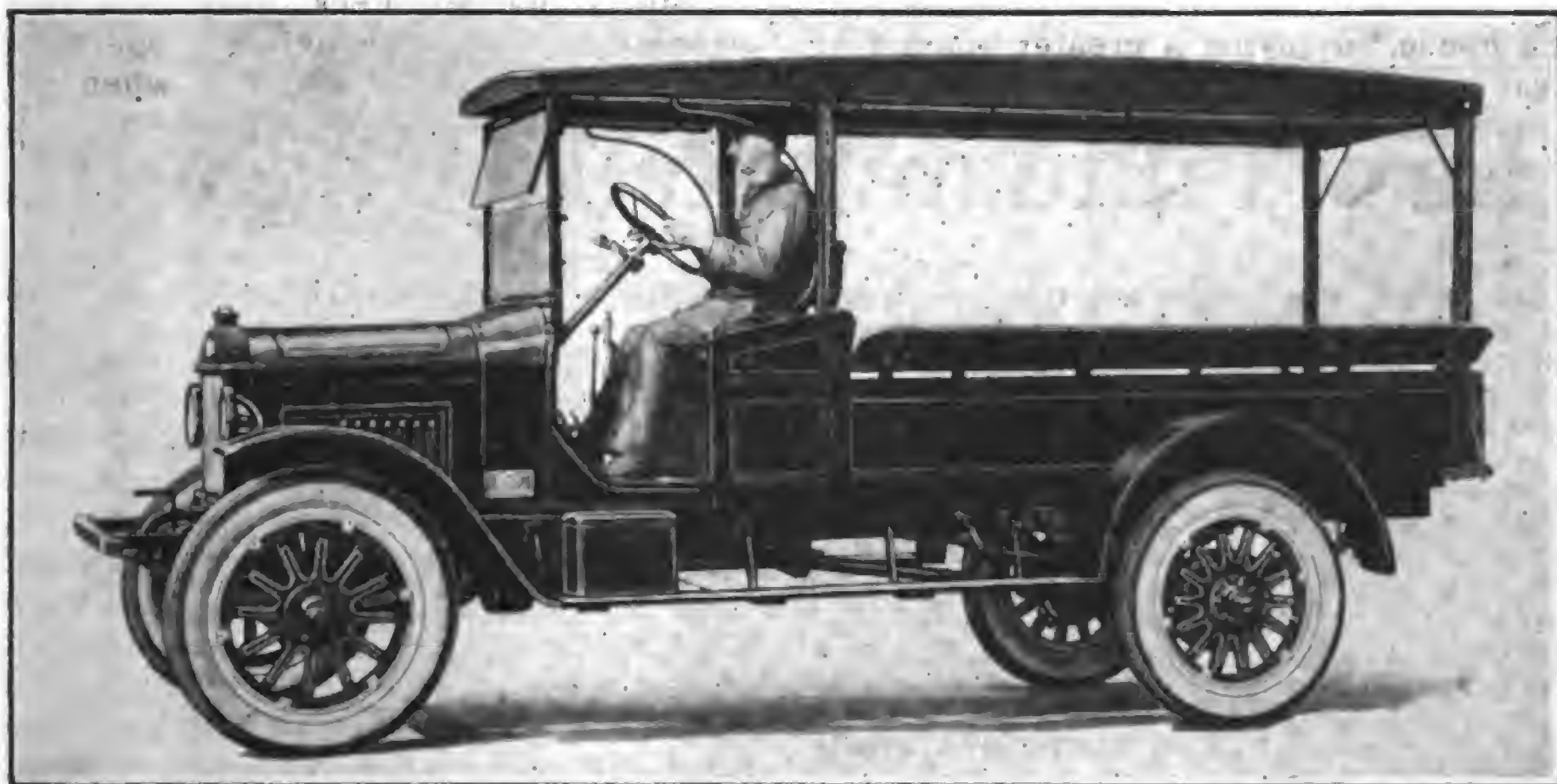
As one passes through this wholesale district in Providence, the provision branch on Canal street and the produce branch on Dyer and South Water streets, the absence of horse-drawn vehicles owned by the wholesale provision and produce men is very noticeable. What might have been predicted a few years ago has now become an established fact—namely, that 9/10 of the produce and provision delivery in the wholesale district is now being done with light, speedy trucks ranging from $\frac{3}{4}$ to $1\frac{1}{2}$ tons in capacity and capable of making from 20 to 35 miles an hour. The wholesalers have proved to their own satisfaction, both by records and actual road service, that speedy motor vehicles are positively necessary for the transaction of their business. They enable the owner to cover a larger territory in less time than formerly, to serve their customers to better advantage, and to supply fresh goods at less cost than it would cost the customers to have the goods shipped by railroad.

Under existing freight conditions, together with higher freight rates, the cost to the consumer is lessened considerably by the use of motor trucks in this type of delivery. In fact, the wholesaler looks at the matter from the side of economy and money-making for his own business, and he no sooner enters the wholesale field than he is in the market for a truck to handle his delivery. All makes are represented, from the Ford Model T costing a few hundred dollars to the higher-priced $1\frac{1}{2}$ -ton trucks, with special bodies adapted to this haulage work, costing up in the thousands of dollars. They are discriminating buyers and do not hesitate to purchase regardless of price if the truck meets their needs.

Push Carts Good Customers.

The newly arrived immigrant, with his push cart, proves a good customer to the wholesaler. They sell in the nearby Italian settlement on Atwells avenue, known as the "Hill," and most any day one can note these push carts along the street curb, dispensing produce to thrifty Italian housewives.

But the new citizen does not peddle from a push cart for any great length of



Trucks of One to $1\frac{1}{2}$ Tons Capacity Are Very Popular with Produce Growers, Wholesalers, Dealers and Peddlers—They Are Speedy and Cover Distances in Very Quick Time.

are thus considered members, although they do not take an active part in the affairs of the association.

Figures are not available at the present time to show the results of this venture, but it is sufficient that the members are satisfied and the association has proved to its members that it solves the farmer's problem of marketing his produce in a quick and efficient manner, obtaining the high dollar for his produce, where otherwise he might have to take whatever price he could get, and as has often happened not being able to receive a new dollar for an old one.

The business of the association is handled by a manager working on a yearly salary, and it is his duty to be in touch with the various city markets within a radius of 50 to 100 miles and know if it is

the success of the venture.

This association and the parent from which it sprang are probably the only two associations in the United States which buy and sell produce cooperatively. There are many associations throughout the central and far western states who sell cooperatively, but so far as is known there are none who both buy and sell on this basis, but one thing that is common to all is the fact that the commercial vehicle has made their prosperity possible.

Wholesale Commission Houses.

Providence, like all cities, has a great number of wholesale houses dealing in produce and provisions. Large quantities of produce are received daily by railroad and a certain amount is also purchased from nearby producers. In the provision business many of the larger

time before he graduates to a second-hand truck and picks up a route further out through the suburbs. A few years more and one will see him laying down the cash for one of the light, speedy trucks such as he has seen in use among the wholesalers and which has been recommended to him by some close friend in the wholesale business. He soon learns business methods and profits by the advice given him by his friends, makes money and saves it, improving his method of carrying on business and adding further to his savings, till eventually we find him entering the wholesale business "on his own."

Motor Trucks Used by Peddlers.

A trip through the wholesale district in the early morning hours demonstrates the fact that light, speedy motor trucks are used largely by the numberless peddlers who drive into Providence from the outlying cities and towns and buy the produce that they need to supply their retail trade. Similar to the conditions found in the wholesale district among wholesalers, about every make of truck is used by the peddlers, from the Ford Model T up to the higher-priced trucks. There is not the same uniformity of buying among the peddlers as there is among the wholesalers, and each man seems to purchase what his pocket book and judgment dictates.

Thus we have another class of peddlers using trucks having a capacity of 2½ to 3½ tons, and often five tons who buy in

large quantities and drive direct to one or more of the larger nearby cities and peddle on a wholesale basis to the small stores and markets. Although the profits made by this method are small, they accumulate fast and in many instances the peddler becomes a large owner of real estate in the course of a few years, thanks to the motor truck.

The territory that may be covered by a truck is only limited to the number of hours of daylight and the size of the load, taking into consideration the capacity and ability of the man and helper to stand up under the work. Instances are known where frequently 60 to 100 miles were covered in a day between daylight and dark by peddlers who drove into the city 15 to 20 miles for their load, returning to their home town and peddling the load between 9 o'clock and dark of the same day, repeating this work daily for the week, but going to a new nearby town each day to peddle. No other haulage method that is known today could enable a man to turn off such an amount of work for a day or week as can be accomplished with the help of the truck.

The expense of operating a truck in this work is hard to arrive at, unless one is fortunate enough to find a peddler who keeps accurate account of his expenditures for his truck, and so far the writer has not been able to meet one.

It is safe to say that the expense is very light when one considers the amount of work that a light, speedy truck is able

to perform. Eight to 10 miles to a gallon of gasoline is a fair average for a ¾-ton truck and 800 to a 1000 miles a gallon is a conservative figure for the oil. Tire mileage is not abnormal, as most all trucks of this capacity are now equipped with cord pneumatic tires.

Trucks having a carrying capacity of 1½ tons are similarly equipped for a like reason and as these tires are usually guaranteed for from 6000 to 8000 miles and instances are known where they show a tire life far in excess of these figures and it is safe to say that tire expense will prove normal, provided that they are kept fully inflated and are cared for properly.

Depreciation can be set down as very low for a truck as its greatest earning power is obtained by keeping the truck busy. The more work done in a given time, say a year, the greater will be the earnings returned to the owner. From observations of the writer it would seem that produce and provision wholesalers and peddlers, using light, speedy trucks, have solved the delivery of fresh vegetables and provisions in about the speediest and most economical manner possible, and that a year or possibly a year and a half of service of this nature pays for a truck, enabling the owner to trade for a new truck at the end of that period and in this way to keep his truck's appearance neat and the mechanical parts, including the tires, in good condition without any great outlay for repairs.

Claim Adamson Law Fundamentally Unsound

CHARACTERIZING the Adamson law as "fundamentally unsound and uneconomical in its effect," the National Implement & Vehicle association, through its executive committee, has gone on record as advocating its early repeal. This law, it is maintained, is a strong contributing factor to the present high freight rates which are working particularly great hardship on agriculture as well as business.

The implement men, recognizing that the welfare of all industries is tied up with the prosperity of the railroads, have also taken a four-square position on labor adjustment agreements, urging their prompt abrogation as a prerequisite to rate reductions.

The resolutions, which follow, clearly set forth the position of the implement manufacturers on these points:

Proposed Repeal of Adamson Law.

RESOLVED, That, supplemental to a declaration of national legislative policy, adopted by the Executive Committee of the American Farm Bureau Federation, at Washington, D. C., April 11 to 23, 1921, regarding the Adamson law, we hereby earnestly express our firm conviction in favor of the repeal of such law, and respectfully urge such action upon the part of Congress, due to the manifestly inequitable and discriminatory features thereof, which created and maintains an artificial work day, during which the amount of wages paid is based on the hours employed, regardless of the character and quality of work performed, such law, therefore, being fundamentally unsound and uneconomical in its effect, be-

sides being a strong contributing factor in the matter of the present high and prohibitive freight rates, the effects of which are particularly adverse to the interests of the basic industry of agriculture and business generally, and be it further

RESOLVED, That copies of this resolution be promptly transmitted to the Interstate Commerce Commission, Washington, D. C., the committees on Interstate Commerce in both houses of Congress, the Railroad Labor Board, Chicago, Ill., and to the United States Secretary of Commerce, Washington, D. C.

Proposed Abrogation of All Labor Adjustment Agreements.

WHEREAS, All industries, including the basic one of agriculture, cannot possibly prosper, unless the credit of the railroads of the country is both restored and maintained, and they be permitted to pursue the same economical practices which prevail in other industries, throughout the country, therefore be it

RESOLVED, That we deem it imperative that the Railroad Labor Board promptly abrogate all labor adjustment agreements, involving the unionization of our great transportation systems, which it inherited when the federal government returned the railroad properties to their owners, which recommended action we regard as unquestionably a prerequisite to the obtaining for the shippers and travelling public, of substantial rate reductions, based on real economical management, through the instrumentality of the open shop and a consequent reduction in living costs, and be it further

RESOLVED, That copies of this resolution be promptly transmitted to the Interstate Commerce Commission, Washington, D. C., the committees on Interstate Commerce in both houses of Congress, the Railroad Labor Board, Chicago, Ill., and to the United States Secretary of Commerce, Washington, D. C.

ENORMOUS TONNAGE OVER COUNTRY ROADS.

WASHINGTON, D. C., Aug. 10.—The necessity of keeping country roads in good condition is shown by a report recently compiled by the Bureau of Markets and Crop Estimates, United States Department of Agriculture, giving the extent to which they are used in hauling farm products to market. According to the report, which shows the tonnage of 11 products hauled on country roads, giving the yearly average for the period from 1915 to 1919, there were 27 tons of these 11 crops hauled for every 100 acres of land. The average tonnage of the 11 crops hauled on country roads each year for the period mentioned amounted to 86,560,000 tons. The 11 crops referred to in the report are corn, wheat, oats, barley, rye, flaxseed, cotton (including seed), tobacco, potatoes and cultivated hay.

TO MAKE A HOLE IN GLASS.

Make a circle of clay or cement rather larger than the intended hole; pour some kerosene into the cup thus formed, ignite it, place the plate upon a moderately hard support and with a stick rather smaller than the hole required and a hammer strike a rather sharp blow. This will leave a rough edged hole, which may be smoothed with a file. Cold water is said to answer better than a blow.

Still Using Camels and Oxen in Asia Minor

WORLD TRAVELLERS RECENTLY RETURNED FROM BUSINESS TRIP SEE GREAT FUTURE FOR SALE OF AUTOMOBILES AND TRUCKS AS AUXILIARY TO INADEQUATE ASIATIC RAILROADS —NATIVES FAVOR AUTOMOTIVE VEHICLES

(By LEO VROOMAN and THOMAS W. FARNSWORTH.)

OF COURSE at the present moment it is not possible to sell motor vehicles in Asia Minor, because of the existing state of war. But recent developments indicate that both the Greeks



Abandoned War-Wrecked German Motor Lorry, a Common Roadside Scene in Some Parts of Asia Minor.

and the Turkish Nationalists are wearying of the long-drawn-out fighting, in which neither side has been able to obtain any decisive and sustained advantage. They apparently would be glad to stop, if they could find a graceful excuse for so doing. It is obvious that this condition of affairs will not be allowed to continue indefinitely. When the country is at peace again it is going to offer exceptional opportunities as a field for the automotive business, and it behooves the American trade to keep a watchful eye on that field and to be prepared to penetrate it without delay.

Before the war motor cars were never seen in the interior of Asia Minor. The people knew nothing about them and were not interested in them. But during the war the German army used trucks and touring cars over the whole territory, and ever since the signing of the armistice the Near East Relief has had a large number of American cars in operation throughout the region. Seeing these cars in use and realizing their possibilities has created a desire for them among the natives. Although it was known that the Near East Relief had no cars to sell, its officials often received requests to sell the cars they were using in their work. Any American who has been in Asia Minor during the past two years will testify to the keen interest that wealthy Turks took in motor vehicles.

Two kinds of machines were most frequently asked for and would probably

prove to be the best sellers: A cheap touring car to run around in, and to use in going back and forth from country home to city shop; and one and two-ton trucks, for freight and passenger service between towns and cities.

In general, the type of car demanded is of the lighter variety. Although a few closed cars would sell, the greater demand will be for the touring car. Other desirable features would be:

1. Fairly large horsepower per weight of car.
2. Extra large cooling system.
3. Disc clutch.
4. Six-cylinder motors.
5. Good spring suspension.
6. Strong and accessible rear axle.

These specifications are suggested because of the rough, hilly nature of the roads and the hot, dry summers.

No Transportation Facilities.

The Bagdad railroad, running south-east and northwest throughout this re-

railroad to the cities and larger towns of the interior, as well as between the cities and towns which are far from the railroad line.

As it is now, men going to such points are forced to travel on horseback or by wagon and, while it is proverbially true that the East is in no hurry, nevertheless even the easterner is apparently always very glad to travel in more haste than the native facilities permit, and is naturally always glad to lessen and shorten the hardships of the journey. The Near East Relief truck drivers were always receiving more requests for "lifts" than they could possibly grant, and these requests were seconded, in almost every case, by a substantial fee. It was most surprising to see what these people were able and willing to pay for the privilege of riding in the trucks of the Relief organization.

A company to carry supplies and passengers by truck south from Samsoun (one of the principal ports of the Black sea) was being organized by some enterprising young Americans, and no doubt

German Military Road Near Oulou-Kishla — Photograph Gives Good Idea of Curves Necessary to Make Ascent of Mountains Practicable for Motor Vehicles — These Well-Constructed Highways Are Now Being Put to Good Use by American Relief Trucks.



gion, with almost literally no branch lines, leaves hundreds of miles of country without any transportation facilities except such as are supplied by camels, horses, mules and oxen. It would be possible to develop a very well patronized motor bus line from the points along the

would be successfully operating at the present time had not the new war interfered. It will probably be only a short time after the signing of peace terms before this undertaking is actually under way.

But is there any money in this war-

devastated country to be invested in American cars? At first sight one would be inclined to answer "No." The residents of Turkey are not a prosperous-looking people. But it is surprising how many gold liras they have been able to hide away. Turkey is an agricultural

western Asia Minor, Smyrna in the far west and Erzurum in eastern Asia Minor would be good centers for starting business. Other important centers could be developed from these.

In the territory along the coast, occupied by the Allied armies, Americans are

mendous possibilities of the country. There are unlimited openings for agricultural, industrial and educational development. And the trade opportunities are as great as those in other lines. Somebody is going to sell Turkey large quantities of supplies, including automobile supplies, in the next few decades. If American dealers arrive on the ground soon enough there is every reason why they should be the ones to make these sales.

NEED OF MOTOR TRUCKS IN AUSTRALIA.

SYDNEY, AUSTRALIA, Aug. 11.—According to a late report from Trade Commissioner A. W. Ferrin, Melbourne, Australia, in larger cities, such as Sydney and Melbourne, some heavy carting is done by motor trucks, but in all cities heavy horse-drawn wagons are used extensively. Motor vehicles are very little encountered in the country sections, where it is not uncommon to see 16-horse teams hauling loads of wool to the railways over distances up to 30 miles. This part of the freight charge on wool and other products is much heavier than the rail charges. In western Australia, camel caravans are occasionally employed at an almost incredible cost per ton of freight carried.

The freight carried by Australian railways annually approximates 28,000,000 tons, all of which has to be carted to the stations and much of which is transferred from railway to warehouse or wharf by road vehicles. In addition to this a vast amount of produce is carried direct to sea ports and emporiums by road. It has been estimated that 80,000,000 tons of freight a year are transported entirely or partially by road, mostly by horse-drawn vehicles.

The pavements of the principal cities are well adapted for motor trucks, but in the country, where their use would seem to offer a prospect of greater economy than in the cities, the roads in bad weather are unfit for motor vehicles.

Movement for Good Roads.

A movement for good roads is reported to be making headway in New South Wales and Victoria, the former state, whose roads generally are not good, hav-



Well-Loaded Convoy About to Make a Steep Grade.

ing recently appropriated about \$25,000,000 for main-road repairs, while Victoria has voted about \$10,000,000 for this purpose.



Note the Speed Limit Signs Which Give This View of the Holy Land a Touch of the Hustling West—It Is Stated That the Prevalence of Motor-Driven Vehicles Has Made These Restrictions Necessary Even in the Leisurely East.

country and was able to get high prices for her products during the war. Many people made large profits by selling grain to the army.

Harpoot and Mezreh, in east central Asia Minor, are twin cities with a total population of not over 35,000. They are dirty and bedraggled looking towns. Yet the Near East Relief, for instance, was able to borrow in a short time over \$100,000 in gold from Turks of these two cities and nearby towns last spring when it was impossible to bring in money from outside to carry on the relief work. In such high regard are the Americans held that these funds were all borrowed on the personal note of director of the relief work.

Gasoline Is Cheap in Near East.

Due to the competition between Russian, English and American oil interests, before the war, gasoline was very cheap in the Near East, and doubtless will be again. This will be an important item in the sale of cars.

A man selling machines would have a much better chance of success if he would include in his selling price a brief course of instruction in driving and making simple repairs. Otherwise some ambitious young Turk or Arab might pour gasoline in the radiator and water in the gas tank. It would also be necessary to have a generous line of spare parts, for it is slow work getting supplies from America. The natives of Asia Minor are expert craftsmen and develop into excellent mechanics. They are used to repairing all types of tools made from iron and steel, but there are only a comparatively few men who are familiar with the mechanism of gas engines.

Good Centers for Starting Business.

Constantinople, Aleppo in northern Syria, Sivas in central Asia Minor, Konja in

already selling cars. In Mesopotamia last winter an American imported a ship load of cheap touring cars as a speculation. He sold them all within two or three weeks. In Syria the same thing has hap-

AMERICA HAS PRESTIGE IN NEAR EAST.

Because European governments have a habit of worming in after their firms have gained a foothold, the Turks are suspicious of European businessmen. America has a tremendous prestige throughout the whole Near East. There is no doubt of the preference the natives hold for American businessmen. This the authors were told many times by Turkish dealers. In fact they were asked to try and get American firms to send salesmen handling all types of machinery to that country.

opened. There a young man who originally was engaged in relief work sold 150 cars, with Beirut as his base, after his term of service with the relief organization was over. He is now in the United States waiting for shipping facilities to take him back with more cars and garage accessories.

Tremendous Possibilities of Country.

One who has been in this land is impressed, perhaps most of all, by the tre-

Rings Recall for Horse-Drawn Fire Apparatus

MOTORIZED EQUIPMENT DEVELOPED TO POINT WHERE PURCHASE IS FEASIBLE FOR SMALLER TOWNS AND VILLAGES—NEW INVENTIONS ENHANCE WORK OF FIREMEN

MUNICIPALITIES, cities and towns throughout the country are very much interested in the motor-driven fire apparatus proposition. Large cities have motorized their fire departments, with but few instances where horses are still in use, and these no doubt, in the next two or three years will be completely motorized. Smaller cities and towns still appear to be somewhat loathe to adopt motor apparatus partly because of the cost and the depreciation encountered when an effort is made to dispose of the horse-drawn vehicles, and partly because the taxpayers fail to see the advisability of making the necessary appropriations for motorized equipment.

As motor trucks have been improved, likewise improvements have kept pace in fire apparatus with the result that now apparatus is offered suitable to meet any need of city or town.

The Peter Pirsch & Sons Co., Kenosha, Wis., manufactures a complete line of equipment for fire fighting, including practically every item needed in a body, suitable for mounting on any type of truck chassis from Ford "T" size to the large 3½ and five-ton trucks. Apparatus manufactured by this company is well known throughout the country wherever high-grade equipment is in use, as nothing but the best of material and workmanship enter into its construction.

Ten Superior Features in "Pirsch" Hose Bodies.

1—The frame work is of heavy angle steel.

2—No. 4 pickled steel panels, rust-proof, hot rivetted to angle frames; all joints set in lead before assembling.

3—Floor boards removable over transmission, rear axle and differential for greasing, adjusting, etc.

4—Rear step and tool box attached and

firmly braced. Rear step and body one unit.

5—Hose roller standard equipment, serving also to hold hose in body going over rough roads, crossings, etc.

6—Hose reel supports hand-forged (or changed to carry hose basket as desired).

7—Hand rails of 1¼-inch No. 14 Brown & Sharpe gauge, seamless brass tubing, except in bodies which have heavy iron pipe railings, black japanned. Front ends have acorns and flanges on bottom.

8—Hand-forged ladder brackets firmly attached to body and acting as body braces.

9—Enclosed rear step, preventing mud, slush, etc., splashing on rear step when travelling.

10—High-grade painting, decorating and finished, as only weather-proof and wash-proof colors and varnishes are used. Striping and lettering in gold. No transfers are used on Pirsch bodies, all lettering being free hand.

Hose bodies are built in any capacity from 500-foot, 750-foot and 1000-foot capacities for 2½-inch hose with iron, or brass railings as desired, and in 1250 to 1500-foot capacities with japanned, polished brass or nickel-plated railings according to order.

Chemical and hose body equipment includes single or double chemical tanks of either steel or brass construction, the hose bodies having any capacity desired, equipped with rear step, railings either japanned, brass polished or dull, or nickel plated and seat of suitable size for two men.

Combination Chemical and Hose Body Equipment.

The hose body is constructed of No. 14 pickled steel panels, angle steel frames, top, bottom and rear, with hard wood

sills. The floor of the body consists of four-inch hard wood slats with a half-inch space between each to allow for ventilation of the hose. The floor of the body is made removable over the transmission, differential, etc., to enable the operator to reach these units for greasing and repairs. The front corners of the body are curved, while the interior is firmly reinforced by steel braces, securely bolted to the cross sills on the bottom of the body and rivetted to the panels.

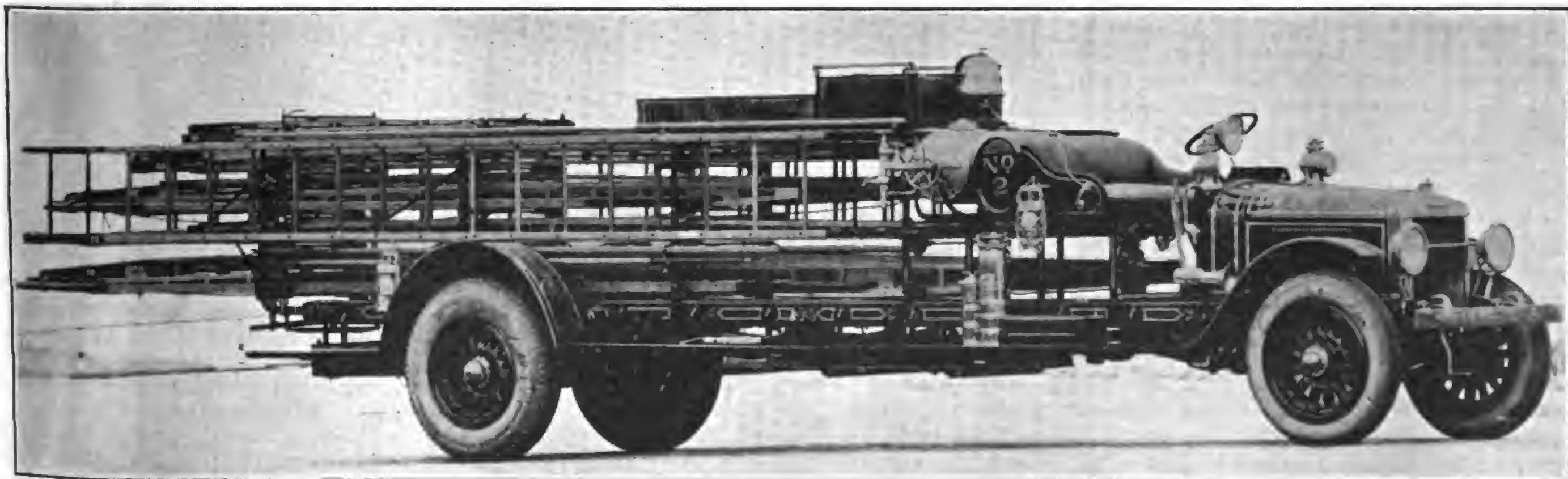
The rear step is of hard wood and is hung from the rear end of the body by hand-forged braces. The step is 16 inches, or deeper if desired, and as wide as the outside width of the rear mud guards and is covered with either linoleum or corrugated rubber matting, bound on the edges with metal. Directly in front of the rear step and under the body and chassis frame there is a hard wood tool box, fitted with spring drop door and lock.

Heavy railings run from the front end of the body down to the rear foot board and are fastened by means of sockets. Stanchions fasten the railing to the body and the front end of the railing terminates in ornamental acorns. The rear rail forms a hand hold for men riding on the rear step.

The driver's seat is of suitable size for two men, is upholstered in genuine leather over coiled springs and curled hair. Hand grabs are provided at either side of the seat for men riding on the running board.

Provision is made for mounting one or two chemical tanks under or at the rear of the seat, each holding 35 or 40 gallons, made of brass and tinned inside to prevent the formation of rust.

All tank joints are properly sweated and soldered and all fittings are of the



City Service Hook and Ladder Equipment Mounted on Special 3½-Ton Motor Truck Chassis Built by Peter Pirsch & Sons Co., Kenosha, Wis.

best grade of red brass. The tank is operated by revolving on trunnions by means of a tipping wheel. The piping consists of three valves, a 2½-inch hose connection, a chemical hose connection and a 2½-inch pressure gauge. The threads on the 2½-inch hose connection

brass holders on side steps in the double-tank body.

Each body carries a 10-inch locomotive bell mounted on the basket, dash or front of radiator as desired.

The lantern equipment consists of two Deitz fire department lanterns in holders

use of village fire departments where it is desirable to spend only a small amount of money on motor fire equipment.

City Service Truck Equipments.

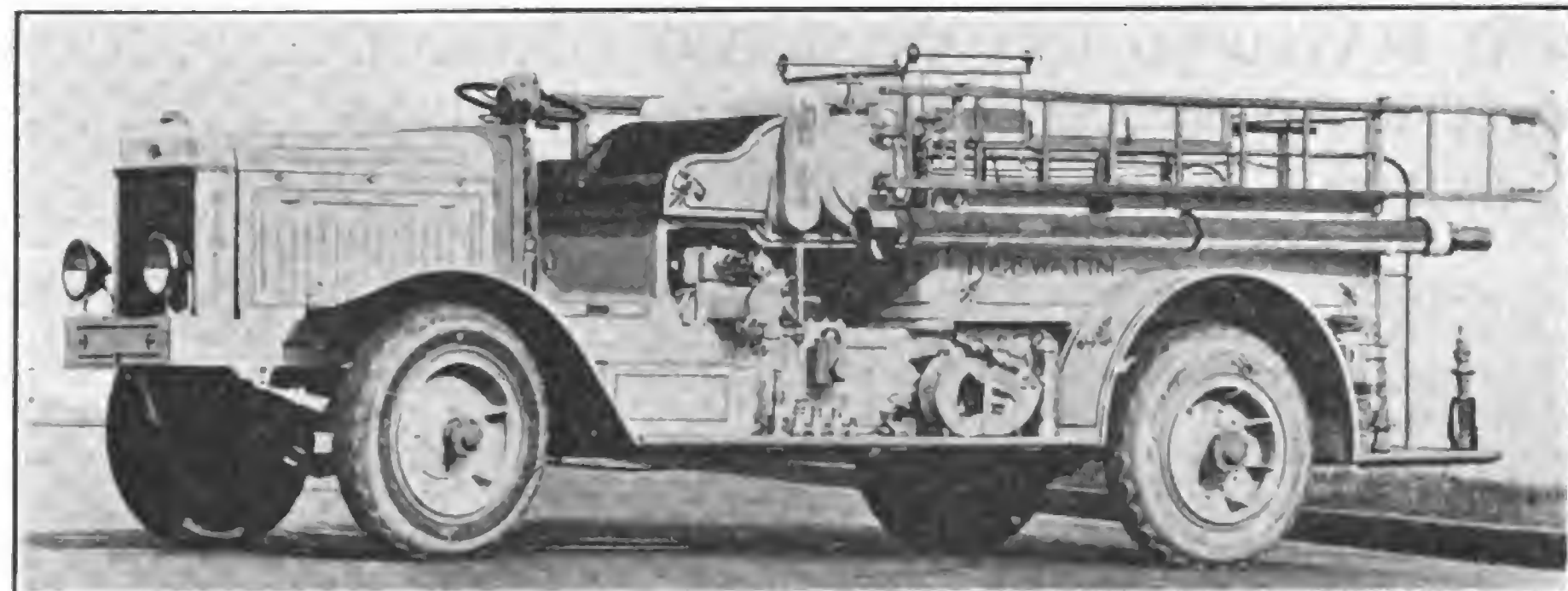
The following specifications cover a complete city service ladder truck equipment:

The seat is the special fire truck type, covered with genuine leather upholstery and wide enough to accommodate two men.

Running boards are placed on each side as large as the space between the front and rear fenders will permit. Rear fenders are provided over the rear wheels. A tool box is placed on one running board of ample size to carry all tools, etc.

The ladder arches consist of one complete set with rubber-covered rollers and flanges, equipped with automatic ladder lock, and the arches are supplied with a brass hand railing on both sides.

The ladder equipment consists of one 50-foot Pirsch patent trussed extension ladder fitted with rope hoist, automatic locks and stay poles; one 40-foot Pirsch patent trussed extension ladder with rope hoist, automatic locks and stay poles; one 28-foot Pirsch extension ladder with rope hoist, automatic locks and stay poles; one 28-foot Pirsch patent trussed single ladder; one 24-foot Pirsch patent trussed single ladder; one 20-foot Pirsch patent trussed single ladder; one 16-foot Pirsch patent trussed single roof ladder; one 12-foot Pirsch patent trussed single roof ladder; one 16-foot Pirsch patent trussed inside extension ladder; two 25-foot Pirsch patent trussed single ladders on sides; one perforated steel basket large enough to hold fireman's rubber coats, mounted on top of ladder arch; two three-gallon fire department hand-operated fire extinguishers with holders mounted on running board; two steel crow bars and holders; four heavy pick back fire department axes and holders; two 12-foot, two 14-foot and two 16-foot plaster hooks and pike poles with holders; two crotch poles with holders; one wall pick with holder; two shovels with



City Service Combination Pumper Equipment, Mounted on Motor Truck Chassis, Becoming Very Popular in Larger Cities.

are cut to fit the city thread, so that the tank may be refilled through this connection or fresh water thrown on the fire through the chemical hose. All piping, tipping wheel, caps, etc., are of the best grade of red brass, polished.

The chemical tank equipment consists of one solid bottle holder for the running board, one soda bag and one wrench on the body equipped with single chemical tank and, on the body supplied with double tanks the equipment consists of four lead acid receptacles, two acid receptacle holders for the side step, soda bag, wrench, etc.

The ladder equipment on the double chemical tank body consists of one 24-foot solid-side extension ladder, rope hoist body type; one 14-foot solid-side roof ladder with folding hooks, carried on the side of body in forged iron holders, or Pirsch patented trussed ladders can be furnished in place of the solid type. In the single chemical tank hose body the ladder equipment consists of one 12-foot solid-side roof ladder with folding hooks attached; one 24-foot solid-side extension ladder, fitted with rope hoist. The ladders are carried on the hose box in strong iron holders; one ladder on each side of the body, or both on one side as desired. The ladders are furnished in natural-colored wood, ends black or, if preferred, Pirsch patented truss ladders may be furnished instead.

A hose basket for the chemical hose is supplied with the single-tank body and a reel for the double-tank body. The hose basket is perforated steel with a wooden slatted bottom fitted with rollers on the top, and is mounted over the body. The hose reel, which can be furnished with this body, consists of one automatic reel, carried on top of the body, having a capacity of 300 feet of chemical hose.

In either body the chemical hose consists of 150 feet of three-quarter inch, four-ply hose, fitted with heavy brass couplings and coupled in 50-foot lengths.

The chemical nozzle is of the shut-off type, ¾-inch size.

The extinguisher equipment consists of two three-gallon fire extinguishers carried in iron holders on the running boards in the single-tank body and in

carried at the rear in front of the step, one on either side.

Other equipment includes one pick axe in holder, one crow bar in holder, one eight-inch pike pole in holder, two hard wood nozzle plugs on the rear step, with an option of either two brass or electric torches on the rear standards or one Pirsch patent hose shut-off and door opener on side step.

Fenders are supplied for the rear wheels of sufficient size. The side steps and driver's foot boards are covered with corrugated rubber matting or linoleum bound with metal strip.

The painting is done in a first-class manner, with best wearing coach colors and varnishes. The body is painted in any color desired, and the striping, lettering and decorations are done in gold leaf with appropriate shadings. The lettering is done to order.

The above bodies, equipped with single or double chemical tanks, are suitable for mounting on any commercial chassis in the three-quarter to 1½-ton class and may be mounted by anyone fa-



Ford One-Ton Truck Chassis Equipped with Combination Body, Pump, Chemical Tanks and Hose Suitable for Town and Village Fire Departments—Bodies May Be Attached to Any One to 1½-Ton Chassis as Desired.

miliar with the proper methods of chassis work.

This body is cheaper in construction than the regular bodies in that all brass has been eliminated, making an ideal body for the Ford one-ton or other light chassis, and is especially adapted to the

holders; one wire cutter with holder; two pitch forks with holders; one tin roof cutter with holder; one 40-gallon chemical tank made of copper, Pirsch type, with piping, gauge, valves, 2½-inch hose connection, two acid bottles and one brass canister for side step.

What Does the Truck Owner Expect?

Does He Look For Free Service? Probably Not—Average Owner Will Be Satisfied with Honest Repairs at a Fair Price—Whole-Hearted Interest of Dealer More Desired Than Grudged Gratuities.

WE ARE realizing to a greater extent each day that the customer must receive dollar-for-dollar value in any purchase which he makes. He may accept, in times of urgent need, an article or a service from which he does not realize full value, but in the end, his patronage and continued good will go with the product from which he gets full satisfaction and value.

The service we render to others is the fundamental of all business relations. This not only applies in the motor truck business, but in every other line of merchandising. In the truck business service does not mean the giving away of anything. It means, or should mean, taking care of the customer to see that he gets full value from his purchase—to see that he secures prompt, efficient and courteous treatment when it is required.

In the early days of the motor truck industry we did not understand the true merchandising principle. Trucks were sold in many different ways—often without limit as to the promises made to the owner, so that his expectations were raised far beyond the possible accomplishment; consequently the disillusionment has been great. The industry started on the wrong foot and a great many of the problems which now confront us are the direct result of misunderstanding the true value of merchandising a piece of machinery.

Had the salesman, in the beginning, said to the prospect: "This truck is a piece of machinery, and as you know all machinery requires attention. There has never been a piece of machinery that was ever built in the entire world that did not require attention. A piece of machinery of any kind is subject to more or less friction. Friction causes wear, wear causes tear and tear means replacement. It cannot be run on, and on, and on, without inspection and the renewal of worn parts." The customer would have understood and have been educated in the necessity of taking care of the piece of machinery. He was led to believe that the word "service" meant the giving away of something. It typified to him that he was entitled to get, for nothing, something. It is my belief that the word "service" should be entirely revamped and its true meaning brought out. Customers have learned, by bitter experiences, that the word "service" does not mean what they thought it did.

What Does the Owner Expect?

What does an owner expect, then, and what is he entitled to expect? What are

his emotions—his hopes and his ideals as to what value he will receive in purchasing a motor truck?

FOR EASY BELIEVERS.

Pleasant Valley, July 27.—This peace-loving town was thrown into a tumult of excitement the other evening by the actions of an invisible traffic cop who, apparently stationed at the cross roads, was directing automobile traffic in quite the manner of one who had seen similar service in a large city.

"Stop—sound your horn," he would yell. "Not so fast, you pie-eyed son-of-a-gun. What do you think this is—a speedway?" The raucous voice was tireless in its complaints, and the same was true of the shrill whistle which signalled the motorists from time to time.

"By gosh," grunted Zeb Dewlop, "the town selectmen didn't tell me nothin' 'bout nobody usurpin' my job. I wonder who the cus is?"

Polishing up his well-worn star—Zeb having been constable for 47 years, it is only natural that the badge should be somewhat brassy in spots—he limped along to the tree from which the sounds apparently originated. He found no one there and opined that the man must be up in the tree.

"Can't climb up after the critter count of this Minie ball in my leg," lamented Zeb. Then, "Hey you—who be you up there?" he shouted.

"Go to the devil," called down the uncivil voice.

That made Zeb good and mad and he went for a ladder and was soon climbing the tree accompanied by the advice of the citizens of the township, the whole 10 of whom had gathered to see what the excitement was all about.

"They ain't nothin' up here," decided Zeb, after a careful survey. "Guess he must a got scared away when I got after him," he decided and descended the tree. Just then one of the Hickson boys passed by.

"What you looking for?" he asked. Zeb told him—at some length. "You didn't see anything of anybody did you?" he asked in conclusion.

"Well—I did and I didn't," said Hickson. "I mean by that, I didn't see no man, but I just caught my pet parrot up in that tree with a hoot-owl. Ain't nothin' to beat a hoot-owl for whistlin'," he laughed as he started for his home.

Is It That Truck Will Never Need Attention?

Is it the claim that the truck would never need attention, that all he had to do was to keep it supplied with gas, oil and water? His common sense tells him that this could not be true of any piece of machinery.

Is It Free Service?

Is it the promise that the dealer will supply so many hours of free service, will maintain his truck for a given period without expense to him? His business intuition tells him that this is unfair; that the basis of all business success is profit, and that the dealer cannot afford to do that; that there must be some catch in it somewhere.

Is It Repairs at Fair Cost?

Is it the statement that the dealer maintains a large, well-stocked and equipped service station where repairs can be made promptly and at low cost? Yes, that goes a long way, but how often does he find that these things are not all true; that the attention he receives is not entirely to his liking.

It is true that the various employees with whom he comes in contact have been thoroughly schooled in the principle that they must be courteous, that they must satisfy the customer; and yet, in doing this, they have forgotten the human side of a business deal. The customer feels that he has received attention because he was a potential buyer of another car, or that his influence—"good will"—was necessary. He leaves with a feeling that his "satisfaction" was bought, that his "good will" was purchased.

I have visited service stations where the principle of always satisfying a customer was adhered to scrupulously, and yet they were so insistent upon applying it, that the customer felt insulted. He sensed the strictly formal application; the genuine, whole-hearted desire to help was lacking.

I believe that the greatest service one can render is to help a man help himself.

What then does the owner expect? When does he feel satisfied?

Free service? No, he does not want that. He really is not interested in the length or scope of the manufacturer's guarantee. He wants to feel that the manufacturer and the dealer are interested in him individually, that they are there to help him, the owner, secure from his purchase the utmost value.

He wants to come in contact with men who by their actions show him that they are whole-heartedly interested in helping him get full value from his purchase. He wants to be shown where he is doing wrong; to have help in overcoming it; to have someone interested in seeing that he does understand, that he does the

things necessary to secure full satisfaction.

He does not want to feel that he is buying his satisfaction. He wants someone to help him get it.

Real Spirit of Helpfulness.

No one, I do not care what his occupation or temperament, will refuse help when it is given in a real spirit of helpfulness. He does not have to be told that defective parts will be replaced, that poor workmanship will be made right. He knows that the institution that believes in the principle of helpfulness will see that he is given full value.

All large industrial institutions have welfare departments, employing trained men to look after the welfare of their employees and their families. Why? To insure satisfied and contented workmen; to secure a greater degree of efficiency. Should not we, therefore, as a service organization, form an institution for the welfare of our truck owners? Are they any the less important?

When a person is drowning, we don't go out in a row boat and, as he is struggling in the water, tell him how sorry we are that he fell in. We jump in and help him, get him on dry land, bring back the life that is almost extinct. We perform a real service; no thought of personal loss or gain enters into our actions.

That, Gentlemen, is the thought that must permeate our organization. We must instill into the minds of our dealer organization the real spirit of helpfulness; of genuine interest in the welfare of our owners.

We must strive with all our might to instruct our dealers in doing everything they possible can to help our owners secure full service from their purchases.

We must get them into the habit of studying each case, just as a doctor does, and then to go about helping him.

We must educate them in the selection of those employees who come into contact with our customers; that they must understand people, their emotions and beliefs. They must be able to sympathize and soothe a ruffled customer; to gain his confidence and to be able to help him.

We must educate the dealer to sell our product so that the intending purchaser understands what he is buying. There must be no promise, implied or otherwise, that cannot be cheerfully met—that it is not fair to meet. The customer must understand that he is buying a piece of machinery that is made of iron and steel; that is deaf, dumb and blind; that cannot give full value unless the owner does his part.

We go to the dentist twice a year to have our teeth examined. Why? To help the doctor? No. To help ourselves; to prevent possible loss and trouble.

Regular Examination Suggested.

The dealer, then, should be taught the value of suggesting to his customers that a regular examination of his truck will oftentimes disclose loose or worn parts which, if corrected in time, will prevent exasperating break-downs later on; that

will save him the embarrassment of having to be towed in.

Too often the dealer has worked on the mistaken theory that the owner should always come to his service station; that he is entitled to any fees that may be collected. The very insistence of this has driven many a customer away, because they are sceptical of the dealer's intentions.

The dealer must convince the owner that the work must be done—either by himself (many owners can, if the dealer will explain how) or have someone do it for him. It is not always convenient for the owner to come to the dealer's serv-

NEED OF TRUCKS ON FARMS.

The truck committee of the National Automobile Chamber of Commerce has just announced the completion of its survey of motor trucks in use on farms in the states of Pennsylvania, Rhode Island and Maryland, which shows that in Pennsylvania with 186,363 farms, only 12,631 trucks are in use and that there are only 11 counties in which there is need for more trucks. In Maryland there are only 2817 farmers who use trucks. Most of them are of the one-ton variety. It is evident that motor vehicles are popular in Rhode Island, because 1350 of them are in use on 3500 farms in Providence and Newport counties. It is stated that additional trucks are needed in Providence county.

ice station. Trucks are bought for transportation purposes. They are unlike steam engines, electric motors or talking machines that stay in one place. They may, and often do, need attention miles away from the dealer's place of business.

The dealer should realize that he could not properly service all the trucks in his territory; that owners must, in emergencies, take their machines to outside repair men.

Dealer Should Cooperate with Repair Man.

The dealer must make it his business to cooperate with every independent repair man in his territory; to secure his confidence and to stand ready at all times to assist in helping his customers. He should make the independent repair man feel that he, the dealer, is interested to the point of wanting him to successfully repair any trucks of the make which he sells; to perform the work so that the customer may secure from it full value.

The dealer must assist the independent repair man in the matter of profits by giving him a 10 or 15 per cent. discount on the parts which he buys from the dealer. This enables the independent repair man to make his charges to the dealer's customers as low as possible and still leave a profit for the repair man. This is of benefit to the owner because he keeps his maintenance expense at a low point.

The dealer should interest himself in the equipment which not only his repair shop has, but that employed by independent repair men. He should make it his business to see that this equipment is of such a nature as will reduce the operating time and increase the efficiency of the work done on any customer's truck.

He should leave no stone unturned in seeing that any customer of his secures the best possible workmanship at the lowest price consistent with good workmanship and that the quality of the workmanship is of the highest order.

Incidentally, while on the subject of equipment, it has always seemed strange to me that time and labor-saving garage and repair shop equipment is not more generally used. Certainly it is not because it is unavailable, as the best engineering brains have worked wonders along this line.

It must be remembered that a motor truck is a piece of machinery subjected to varying kinds of wear and tear and that, by its very nature, it must receive the attention of competent repair men regularly.

The merchandising of motor vehicles is entirely different from any other line of merchandising because, with the sale of a truck the responsibility of the dealer and manufacturer really begins and, thereafter, during the life of that car the dealer's and manufacturer's obligation is to maintain it, not free, because the customer does not want that, but to maintain it satisfactorily and to help the owner get from it the utmost value.

Isn't that, after all, what the owner ought to expect and what he does expect? When he spends his good money for your product, hasn't he a right to believe that he is entitled to get from it full value? And isn't it our obligation to see that he gets it? To see that the service which we and others render him in the way of maintenance is efficiently done at low cost?

Isn't that the true meaning of "service?" Wouldn't that be helping the owner help himself?

Editor's Note—The foregoing paper was presented at a recent Dealers' convention by a recognized authority on the merchandising of motor vehicles.

William E. Corey, chairman of the board of directors of the Midvale Steel and Ordnance organization, has been elected a director and member of the executive committee of the International Motor Truck Co. in place of Ambrose Moonell, deceased.

Newly Developed Road Builder Saves Costly Labor

**TRUCKMIXER SYSTEM OF MIXING AND HAULING CONCRETE ALSO
DOES AWAY WITH NEED FOR PAVING MIXER IT IS CLAIMED—
SHOULD FIND BIG FIELD IN GENERAL BUILDING OPERATIONS**

THE Stamp Truckmixer method of hauling and mixing concrete for road construction, and general contracting service, while new to many, is the result of several years of experimenting on the part of the manufacturer, the Truckmixer Co., Milwaukee, Wis.

The Stamp Truckmixer consists of a concrete mixer mounted on a short wheel-base truck chassis in place of the truck body. The ordinary batch body with its hoist is replaced with a specially constructed frame which fastens on to the chassis and supports a rotably mounted concrete mixing drum. The power formerly used to operate the hoist is transferred to the drum, making a direct and efficient drive.

The entire mixer, with its mechanism, has fewer parts than the ordinary dump body and hydraulic hoist. Stone, sand and water are put into the drum direct from bins and the required amount of cement is added at the cement shed or car. Mixing is preferably done on the final stretch, just before discharging, but the drum can also be rotated at the beginning of a haul and then given a final re-mix action when in place to discharge. When it arrives at the place of laying the concrete the truck is turned around and backed up, the mixed batch is discharged by gravity into a chute which delivers the material to the rear of the truck, and as it moves forward the chute spreads the concrete so that only a minimum of hand-spreading is necessary.

The drum holds and mixes the same amount of material as that held by the dump bodies. This new hauling and mixing method reduces concreting to nothing more than a hauling and finishing operation and while finding its greatest application on road and street construction, will also find a big field in small building operations where mixed material can be delivered ready for the forms, thereby eliminating all rehandling and necessity for a mixer on the job.

There are five big, outstanding advantages of the Truckmixer system of building roads:

With the long time mixing which is possible with Truckmixers a workable consistency can be obtained with considerably less water. Reduction of water means greater strength of concrete.

It eliminates the paving mixer, with its crew of wheelers and operators, and also the cost of fuel for operating the paver and the expense of moving it on and off the job.

It permits trucks to operate with maximum efficiency. Time-consuming delays due to bunching at the mixer are done

away with as two trucks can dump side by side. Furthermore, it takes considerably less time to discharge the mixed concrete than to dump two or three batches into the mixer skip. There is no mixer to limit the output and if the length of haul is reduced the trucks can make more trips.

The yardage possible is dependent only upon the number of Stamp Truckmixers used. By employing large fleets and working at two or more points if necessary, greater yardage can be placed than with any other method.

With the Truckmixer system concrete can be mixed five minutes at no additional expense or waste of time. Data furnished by the Portland Cement association show that only 80 to 85 per cent. of

number of batches for the mixer. The large investment in a paving mixer is eliminated, as Stamp Truckmixers cost only slightly more than the ordinary dump body and hoist.

TRADE-MARK DECISION FAVORABLE FOR WALDEN-WORCESTER.

In recent proceedings brought by the Walden-Worcester, Inc., of Worcester, Mass., against the American Grinder Manufacturing Co., Milwaukee, Wis., for the cancellation of the latter's trademark "Blackhawk," it is reported that the United States patent office has rendered a decision favorable to Walden-Worcester, Inc., the patent office examiner holding that the Walden-



Concrete Mixer Driven by Power from Engine Offers New Method of Mixing and Hauling Batch to Construction Work—Saves Time, Labor and Expense.

the strength of concrete is brought out in the first minute of mixing and that the other 15 or 20 per cent. can be obtained by mixing up to five minutes. This is equivalent to a cement saving and will work large economies in road construction.

The Truckmixer system of road building has many other advantages, such as eliminating all delays due to break downs of the paving mixer, and pumping equipment. The fact that all equipment is on wheels makes it easy to transport it to new locations and to keep it under cover at night. In many cases it will reduce the pumping equipment necessary, because water for mixing is hauled in the trucks.

Trucks can be loaded to exact capacity by varying the size of the batch by bags of cement used, instead of hauling a

Worcester, Inc. (which is proprietor of the trade-mark "Tomahawk") has been injured by the registration of the trademark "Blackhawk."

Walden-Worcester, Inc., has also recently instituted a suit in equity in the Federal District court of Wisconsin against this same company for unfair competition, and trade-mark and patent infringements. C. N. and F. W. Jonas Brothers of Chicago, Ill.; San Francisco and Los Angeles, California, are stated to be joint defendants. C. N. and F. W. Jonas Brothers at one time were selling agents in the West for the Walden-Worcester, Inc.

Walden-Worcester, Inc., is a pioneer in the manufacture of wire-handle socket wrenches and the wrench line of this company includes specially designed socket wrenches for automotive work.

Valve Regrinding and Reseating

Leaky Valves Often the Cause of Loss of Compression—Haphazard Methods Should Not Be Tolerated—Time Required to Do Perfect Work Best Determined by Repairer

GRINDING of valves is probably a job that is dreaded by more repairers and owners of cars who do their own repair work than any other about the car. Although not difficult if the person doing the work understands what results he wants to obtain, on the other hand a large amount of time can be consumed and the work done in an improper manner. Time means money and money means expense today in engine repairing, and an understanding of the requirements of valve grinding will assist greatly in performing this highly important work in the shortest possible time with good results.

The exhaust valve is usually the one which requires grinding the most often, the reason being that this valve opens just after the power stroke and receives the last end of the explosion. As it opens very quickly, more or less of the flame and heated exhaust gas passes through between the valve and its seat. Carbon is bound to collect in the combustion chamber and, as the exhaust gases are forced out by the returning piston, particles of carbon are forced out with it, oftentimes catching on the edge of the valve between the valve and its seat. These carbon particles harden by the hammering of the valve and cause the valve to seat improperly, allowing the burned gases to pass by when the valve is supposed to be in a closed position. The continuation of this causes the face of the valve near by the hardened carbon to pit rapidly. The engine shows weak compression on that cylinder and fails to develop its rated power.

To overcome this trouble the valve should be removed, the carbon scraped off and the valve or valves, if more than one is affected, reground to a new seat.

There are several methods of grinding practised by repairers, depending upon the equipment of the shop. The ordinary method and one that is most common is that of using a screw driver. Many valves are provided with a slot in the head and the screw driver easily fits this slot. Others have two small holes spaced equidistant on the head which requires a special forked tool, the points of the fork fitting the small holes in the top of the valve and the other end fitting a wooden handle or a bit brace or other device which imparts a rotary motion to the tool.

To grind a valve with a screw driver hold the handle between the palms of the hands and impart a rotary motion to the tool between the palms of the hands. As they move forward the hands turn the tool in one direction and the reverse mo-

DECALOGUE FOR GAS-SAVERS.

1. Gasoline wastes rapidly if exposed to the air. Be sure and keep all containers air-tight.
2. Use washing powders and kerosene to cut grease. Gasoline is too expensive.
3. Shut off your gasoline at the feed pipe when your truck is to stand for any length of time.
4. Don't have dragging brake bands and see to it that all bearings run freely.
5. Watch your routing. You can save a whole lot of gasoline by carefully planning your delivery schedule.
6. Coast all hills possible and don't accelerate or stop too quickly. This saves a lot of gas in a year's running.
7. Keep out of the high-speed class. There isn't a truck made that won't get you there in time under ordinary running conditions.
8. If you want a hot spark take a little time and go over your plugs and spark points. This is mighty important in saving fuel.
9. Don't run that engine when your truck is standing still, unless you are only planning to stop for a couple of minutes.
10. Service stations will ordinarily adjust carburetors without charge. Take advantage of this and call frequently.

tion is given as the hands are drawn back.

A bit brace or breast drill is often used for this work, the objection being that the grinding is liable to be done unequal-

ly, one side receiving heavier pressure than the other. The use of special electric grinders is becoming very common where considerable work of this nature is done, and as these are made especially for this class of work, the saving in time required to grind the valves in a car makes their use very popular.

For touching up valves or grinding valves in a single car the screw driver answers the purpose very nicely and, if handled properly, will show a ring about 1/32 of an inch wide on the face of the valve and its seat. This ring may be either smooth and glass-like or rough finished as desired. It is often noted that a rough-finished valve seems to give better compression than does the smooth-finished. The grinding should be done with a grinding compound that contains a very small amount of emery, the smaller the amount the better. Ground glass is often used and there are many preparations on the market sold by dealers that are used satisfactorily. Compounds for valve grinding come put up in tin boxes, two grades in a box, coarse and fine. The coarse is used at first and the valve is finished with the finer grade. One brand is supplied with the abrasive suspended in grease, and this proves a very popular way to apply it, as it is not necessary to mix it with oil as with the dry compounds.

To use, apply a small quantity to the face of the valve with the finger, using the coarse abrasive at first. Place the valve in the valve stem bushing, allowing the valve to seat, giving it a rotary motion with the hands. Lift the valve and turn again, repeating the process until the abrasive fails to cut. Remove the valve, wipe off the old abrasive from the valve and seat, and repeat the process by adding new compound. After the valve begins to shape up properly in its seat, continue the process with the fine compound until a bright ring appears that has a glass-like smoothness. A coiled spring under the head of the valve will help you when it is desired to have the valve lift from its seat to give fresh cutting abrasive.

Unless one is familiar with this class of work he will find it a long, tedious job, requiring plenty of patience. If the valves only require touching up, a few hours will suffice, but if they are badly pitted the grinding operations will be considerably lengthened.

Valves that have been ground often soon reach that state where they penetrate into the cylinder casting so far that they will not seat properly when reground.

Correct Chassis Lubrication

Important Item of Truck Operation Often Sadly Neglected—Low Cost Car Mileage Depends Primarily on Correct Lubricants Supplied at Proper Mileage and in Right Quantities

EVER since passenger cars and motor trucks have been used extensively for modern road travel and haulage, the manufacturers of these vehicles have been trying in every way possible to instruct the general public who operate these vehicles that correct lubrication of the units of the chassis is essential if the owner expects to get the utmost service from the vehicle without undue repairs.

Manufacturers' instruction books give in their pages the proper lubricant to use in the different units and show by charts the location of the units and the length of time or mileage that the car should operate before the units need further lubrication. These charts are usually very clear and even the novice should have no difficulty in determining when and how the units should be lubricated.

For several years the slower moving units, such as the spring bushings, steering joints in the steering linkage, etc., were lubricated by means of compression grease cups, which required filling at stated intervals, and turning down by hand to force the lubricant into the bearings. The fault in this method of lubrication was that owners of the vehicles forgot to turn the caps, with the result that the bearings and bushings would run dry quickly and excessive wear would set in, soon cutting the bearing and making renewal necessary.

Again the dust from the road would collect on the ends of the bearing and be unsightly, and the old lubricant would harden on the interior passage to the bearing and prevent the entrance of the fresh lubricant, causing the bearing to run dry without the owner's knowledge.

To obviate this defect in lubricating slow-moving bearings, several systems have been devised which, instead of a hard or semi-hard lubricant similar to the consistency of grease, use heavy fluid oil, which will flow under pressure and supply the proper lubricating quality to the bearings and still run into place readily. This substance is called steam cylinder oil and is about the color of molasses and must be forced into the bearing with a pressure gun.

Most of the systems in use are hand-operated, consist of a cylinder and plunger, which can be filled with steam cylinder oil, the plunger forcing the oil by means of a threaded shaft or screw and operated by turning the handle. A flexible tube connects the cylinder with each individual bearing and a special connection is provided at the bearing and a special socket on the flexible tube fits the bearing connection, preventing waste of the lubricant.

THE DRIVER'S CALENDAR.

EVERY DAY.

1. Fill certain grease cups.
2. Turn down all grease cups.
3. Oil specified parts.
4. Examine oil gauge.

EVERY WEEK.

1. Fill all grease cups.
2. Oil steering column.
3. Fill worm gear housing.
4. Oil magneto every 500 miles.
6. Clean engine thoroughly.

EVERY MONTH.

1. Drain and refill crank case.
2. Inspect and fill gearset case.
3. Pack front hubs with grease.
4. Clean spark plugs.
5. Inspect, clean and tighten all parts.
7. Clean and pack steering gear ball joints.

All slow-moving bearings are now provided with these connections and it is only the work of a few moments to thoroughly lubricate them.

Many motor trucks are provided with Oil Kips, which is a decided improvement over the old-time compression grease cup. They consist of a large cup screwed into the bearing housing and are filled with cotton wicking, which acts as

a wick feeding the soft oil lubricant to the bearing as required. Other types depend upon the oil overflowing the top of a spout or tube set a predetermined height, which allows the oil to trickle over and down this tube to the bearing. The motion of the truck assists the oil in its downward flow and the lubrication of the bearing is more or less positive.

Still another system that may be used on passenger cars and possibly on motor trucks consists of a centrally-located tank holding the lubricant, containing a power operated pump. Pipe connections from the tank connect every slow-moving bearing of the vehicle and when lubrication is required all that the operator is called upon to do is to start the power-operated pump connected to the engine, open one or two valves and the lubrication of the bearings is accomplished automatically.

Oil Should Be Right Grade and Quantity.

Owners should do everything to provide for the thorough and efficient lubrication of their cars or trucks if they wish to receive the utmost service at a minimum of cost.

Imagine trying to run the world's work without sufficient lubrication. The result would soon be a complete wreck. Naturally, proper lubrication of an automobile is absolutely necessary; in fact, more of an essential than gasoline. The only caution required is to use good judgment in selecting the particular grade for your car.

The grade of oil chosen should not be too heavy or too light. The heavier or thicker oils retain considerable carbon that is apt to accumulate on the pistons, valves and cylinder walls. Too light a grade has much of the carbon extracted and many lack the viscosity necessary for the engine.

Many manufacturers are eager to advise motorists as to the proper grade of oil to use in their engines, as their experience with the problem of correct lubrication has been gained after years of exhaustive tests.

When breaking in a new car, all of the parts must be well oiled to start them on the way toward the most efficient service. Then the good work, once started, should be continued regularly. Some of the best known lubricants are put up in sealed containers. These brands are scientifically graded for the particular purpose for which they are prepared.

The experienced motorist never neglects to examine closely the quantity of oil in the engine reservoir daily, keeps the grease cups or slow-moving bearings plentifully supplied with lubricant and knows that they are functioning properly.

EDITORIALS

THE ROAD PATROLMAN.

It costs a whole lot of money to build the modern highway. Regardless of what materials may be used in the construction, depreciation is rapid and there are numerous instances of short-sighted officials who, while they have builded in proper manner, have, through lack of sufficient appropriation to take care of natural erosion and the defects caused by heavy traffic, allowed the roads to go so long without repairs that, in effect, the entire sum originally spent has been wasted.

Engineering practise lays as much stress on the proper upkeep of the highway as on the original work of construction, and it is far better to spend only a portion of the appropriation on road building, and the balance on its proper upkeep, than it is to spend the entire sum on building an expensive road and then allowing it to go to ruin through neglect.

Many states have adopted the road patrolman system by which one man patrols a certain stretch of roadway and cares for defects before they become serious. In Wisconsin one patrolman has been found sufficient to handle an eight-mile section and there are nearly 1000 of these patrolmen at work according to recent report. As a result of this system, Wisconsin is claimed to have better highways than Illinois, where more is being spent on roads.

It takes but a short time to fill up the little hole when it first starts, but if you let the trucks and automobiles grind it down for a few weeks, it is a serious job to repair it. One hole tends to make another. A car that is dipping up and down through holes is wearing what is left on the road faster than one that slips along on a smooth surface.

TO HELP THE FARMER.

Every American farmer is vitally interested in the effort of the Foreign Trade Financing Corporation to create the necessary machinery to keep the foreign markets open for American products.

This is only natural as it is conservatively estimated that of the products of America's farms, mills and mines, from 20 to 25 per cent. are sold abroad and of these products from 45 to 65 per cent. come from the farm.

Of the \$80,000,000,000 invested in American industries, over \$41,000,000,000 represent investment in what may rightly be termed the farming industry.

The corporation has planned to serve the farmer in

much the same way as it does the manufacturer. It will keep open for his surplus products the markets of the world. It is estimated that during 1920 the farmers produced a surplus of 300,000,000 bushels of wheat above what was required to fill the demands of the people in the United States, while planters produced a surplus of over 2,000,000 bales of cotton. It was the partial closing of foreign markets to our products, through the breakdown of credit machinery and the accumulation in the American granaries and warehouses, that contributed to the difficulties of the farmer in the past year. This applies not only to grain and cotton, but to tobacco, meat products, condensed milk and other farm products. American agricultural communities have suffered to a greater degree during the past six months than during any similar time in a generation.

Because of its widespread ownership, its international connections, its agencies abroad and the representatives and investigators it will have throughout the world, the Foreign Trade Financing Corporation will be enabled to provide, for American financial and business interests, superior service in the way of data and information bearing upon the foreign demand for American raw materials, food stuffs and other products, the available supply thereof, the American demand for foreign goods and products, the available supply of such goods and products, world financial conditions, the foreign investment markets, foreign exchange markets, credit ratings and other general and specific information.

HAS SPENT \$20,000,000.

Figures compiled by the state highway department of Oregon show that for the last two years more than \$20,000,000 has been spent by the department in building and improving roads in Oregon. Out of this amount \$13,110,221.31 has been spent during the last year and \$6,889,778.69 during the previous year.

Included in the total amount is about \$1,000,000 in county money spent under supervision of the state department and \$1,200,000 of federal money spent on forest and post roads.

It is stated that there are now under contract 300 miles of grading, 250 miles of rock or gravel and about 60 miles of paving.

During the two years approximately 144 miles of highway have been improved. This includes 686 miles of grading, 395 miles of rock and gravel and 363 miles of paving. Most of the work was on Columbia river and Pacific highways.

EDITORIALS

THE TOWNSEND BILL.

Letters to more than 30,000 motor vehicle dealers have been sent out by the National Automobile Dealers' association in the last month, calling the attention of the trade to the importance of the Townsend bill, providing for an interstate road system, and a Federal Highway commission.

In addition individual letters and telegrams have been sent to dealers in a dozen states asking them to bring to the attention of senators opposed to the Townsend bill, evidences that the general public wants roads that begin somewhere and end somewhere. Already in Washington, and among the newspapers sentiment is beginning to declare that the Federal Aid bill without the Townsend safeguards will be nothing more than a pork-barrel appropriation, and it is feared that such stigmatization will forever ruin the chances of building a national highway system.

Therefore, it is important that every dealer take it upon himself to assure and reassure his congressman and senator that he is in favor of the Townsend measure, and to call upon all business interests of his city and state to get behind the measure. A great deal of good can be done by seeing your law makers either when you are in Washington, or when they are at home, and telling them you favor a national road system.

Motor transportation is one of the great factors in the life of every person in America. The use of the commercial vehicle in the hauling of food stuffs has already materially reduced, speaking from a standpoint of proportions, and when decent roads are built with a consequent of quicker and lower priced transportation, prices of food will go still lower. We have spent literally billions of dollars for highways and what have we to show for it? Nothing like the results that should have been gained.

The whole proposition of road building and maintenance—and this latter is the more important of the two—should be in the hands of the Federal government. Let's all get together and drive local politicians out of the matter.

STUDY YOUR TERRITORY.

There are certain well-defined rules for the successful selling of every form of merchandise. Fundamentally, all salesmanship is based on these abstract principles. Every salesman uses them either consciously or by instinct. They form the basic fabric of all real salesmanship.

There are certain specific rules, however, that the

salesman must study out and apply to his own particular case. One truck salesman of the writer's acquaintance—an unusually prosperous young man—claims that the whole secret of his success may be traced to the fact that he has made an intensive study of his territory.

He has a small leather-covered book which he keeps up to date. Its compilation has called for a lot of work on his part, but he feels that he has been more than well paid for the time spent in getting his figures. One glance at this book, the subjects of which are arranged alphabetically, shows the following:

1. Population of entire territory.
2. Number of farms.
3. Wealth per capita.
4. Number of trucks in territory.
5. Probable demand for trucks.
6. Persons who use truck 12 months.
7. Business houses using trucks.
8. General tendency of buyers as to price of truck purchased.
9. Conditions of outlying highways.
10. Tendency of community toward road building.
11. Farmers who should use trucks.

A little knowledge comes in mighty handy in the merchandising of automotive products and it seems as though it would be well-nigh impossible for a salesman to get very far these days without knowing his territory and its possibilities for new business.

PURCHASING PERSONAL SATISFACTION.

The owner who buys a motor truck nowadays is not looking for speed. He wants the satisfaction of knowing that his machine can lengthen out a bit if the occasion demands, but he is mainly concerned with road dependability, daily performance, and the lasting qualities of his machine. The day when a man merely bought a truck by the trade mark name has passed. He first demands dependable character manufacture, and, second, attention from the dealer to back up the good job of building done by the manufacturer—because he isn't buying a new truck every year as he formerly did. He may have the willingness to purchase every 12 months, but his pocket book simply cannot stand it. Whether he wills or not, he must buy for service and durability—for the personal satisfaction that he feels in the good value of his purchase, and this means that the dealer must assume fully as much responsibility as the manufacturer.

A PROMISING YOUNG MAN.

"This young salesman you took on a few months ago is a mighty promising young man, isn't he?" asked one dealer of another as they were lunching together.

"Yes," answered the other dealer, "answering your question literally, he is a promising young man—he's too much so."

"Too much so?" returned dealer number one, questioningly. "Just how do you mean for me to take that remark?"

"I mean that he is a wonder at getting rid of the trucks. He's a wizard with a fountain pen when it comes to getting them to sign on the dotted line. But I'm frank to tell you that his sales methods are a caution, and that's where the promising part of it comes in. He'll promise anything from free air to free engines in order to make a sale, and I can't begin to tell you the trouble he's got me into."

"He thinks the word service begins with a dollar sign. He actually loses customers instead of making them. Why, if I gave all the free service that bird has promised I'd be doing business in a field somewhere by this time. He'd have the sheriff's sign on everything I own. I've kept him on, hoping that he would get wise to himself, but he's getting worse. By the way—you don't want to hire him do you?"

"No," grunted the other dealer as he pocketed the luncheon check, "I've got a couple of Captain Kidd's blood relations working for me now. They're promising enough. Another of the same breed would have me singing 'Over the Hills to the Poor House.'"

Talking Things Over

THE greatest merchandising problem confronting the dealer in supplies for the automobile, truck and tractor, is whether to operate his business under the cash or credit system. There is nothing new in this question. It is equally as old as business, and its solution rests wholly in the hands of the individual merchant.

There are a multiplicity of arguments that cause one to favor the credit method, and there are equally as many that lead one to think of the cash system as the better. The mammoth business done by the chain stores speaks highly of what may be accomplished by the merchant who thoroughly understands cash merchandising. On the other hand, one has but to look at the great businesses that have been built up almost wholly through cheerfully extended credit to realize what can be done by credit methods of the better kind.

The credit way of doing business has certain apparently well-defined features of advantage, but in this writer's opinion, formed through intimate experience with both methods of retailing, these advantages are more than offset by the disadvantages of the credit business. Let us review both sides of the question and see what conclusion the real facts lead to.

Advantage of Credit Business.

THERE is no doubt but that the store doing a credit business totals a far greater volume of sales than does the store that is operated on a strictly cash basis. This is caused by three material factors. First, the steadier patronage, which totals about the same from week to week and month to month. The person having credit at a store will do business at that store, even though he may be in a position to make his purchases at a lower price and at greater convenience somewhere else. It is a fact that a man will run his truck with a flat tire right past several places where he might purchase for cash, simply to get to the store where he has credit.

The second reason why the credit store does a greater volume of business is because it sells as much at the end of the week as it does at the beginning. This is because the customer, not having to pay cash, can purchase just the same as though he had the cash to pay with, whereas the cash store customer, simply because his supply of ready money is depleted early in the week, does without certain things until pay day comes again.

The third reason that helps to increase the volume

of sales for the credit store is the fact that its customers do not pay so much attention to the price of the goods, and it is always possible for this class of store to sell for a few cents more than the cash stores. The credit customer, not having to dig into his pocket for the cash with which to pay for each purchase, does not hesitate to pay the slightly inflated price, while the cash customer usually has a very good idea of what he should be charged and does not hesitate to do his trading where he can buy the cheapest.

Incidentally, this great difference is readily noticed by the man who has clerked in the cash store, and then goes to the credit store to work. He is surprised to see customers frequently ordering goods without even asking the price, whereas in the cash store they asked the price of everything they purchased and did not hesitate to leave without making the purchase if the price proved to be too high.

It seems to the man who has not carefully studied the matter as though more sales would mean greater profits, but it does not follow that the merchant is making money, simply because his sales volume is great. Cash return is reckoned from net profits, and it is right on this point that many merchants fool

themselves. They figure from the wrong objective with the result that they spend their lives in working twice as hard as their profit warrants.

They see the tires and spark plugs going out through the front door, the shelves being depleted, and the bookkeeper working over time and think that they are making money. They are doing a fine business, no questions about that, but how about the net profits? That is the figure that the merchant is interested in and one that he cannot overlook. Therefore, because there is no sense or reason in working 12 hours a day to make a living when the same amount of money can be made in eight hours, let us look over the facts and see if the advantages narrated are not more than offset by the marked disadvantages.

Disadvantages of Credit Business.

In the first place, the credit business demands an extra amount of capital. This is made necessary because, regardless of whether the customers pay the dealer or not, he must pay the jobber and the manufacturer, and money on the books doesn't discount any bills. The cash dealer, even running along with a small capital, gets his money the minute the goods are handed over the counter, and thus is always able to use the full purchasing power of what he has invested. It is always either in the bank, the cash drawer or on the shelf in the form of goods. That's disadvantage number one.

Disadvantage number two is the expense of running an accounting department, in itself no small item. It means spending money for expensive systems, the use of expensive space, the wages of two or three bookkeepers, and counts a whole lot in favor of the cash method of doing business, as anyone who has had the experience will testify. The cash dealer has none of this expense.

The third disadvantage of running under the credit system is unpaid bills. The merchant stands up day after day and hands out goods for which he never receives pay. Imagine what that means. You can't if you haven't experienced the feeling of tearing up a few thousand dollars worth of outlawed and uncollectible bills. This last item does more to cut the profits of the credit operated business than any other one thing. Every merchant who has trusted has lost money in this manner and, regardless of who the man may be, must admit it, if he tells the truth. To be sure there are certain retailers who have control of their accounts to a degree where their loss is small, but there is no merchant who can show a clean set of books from year to year, and the usual total of bad bills is greater, rather than smaller, as time goes on. Here again the cash store scores a great advantage.

There are other disadvantages of the credit business that need not be given mention in this article, but there is one that should be spoken of since very few merchants think to give it consideration, and that is the loss of interest money that accounts on the books, if liquidated, would bring while merely lying idle in the

bank, not to figure the discounts that such money would save if available for settling current bills.

From the foregoing it appears that the cash business is far more desirable than the business that is operated on credit; certainly it is a whole lot cleaner.

DON'T GIVE UP.

Even though you have failed to sell the prospect a truck at the first visit, don't give him up and, most important of all, do not let your temper or disappointment get the better of you so that you will antagonize him, thereby making it impossible for you to visit him again. When there is no hope whatever that you will sell him that day, leave some strong advertising matter with him. Tell him that of course you can understand that it is difficult for him to make up his mind, as it is a new proposition to him. Ask him to think about it, and then call again. Give him, when he leaves you, one strong argument to remember.

If your demonstration has been what it should be, it will have made an effect on the prospect, although, perhaps, he does not show it, but he will think about it, and when you call on him again, on your next visit to the place, you will find him in more receptive mood.

THE SILENT PROSPECT.

Some salesmen seem to think that the art of selling lays in talking, and they sometimes acquire the habit of talking too much. The prospective purchaser who smilingly assents to everything a salesman says does not intend to buy. He is framing up an excuse for himself.

GET ANOTHER START.

It is a fact that some of the real tough problems of the truck salesman are made harder because he expects them to be hard. If you make up your mind that anything is going to be a mighty difficult job the chances are that it will be. It's all in the point of view.

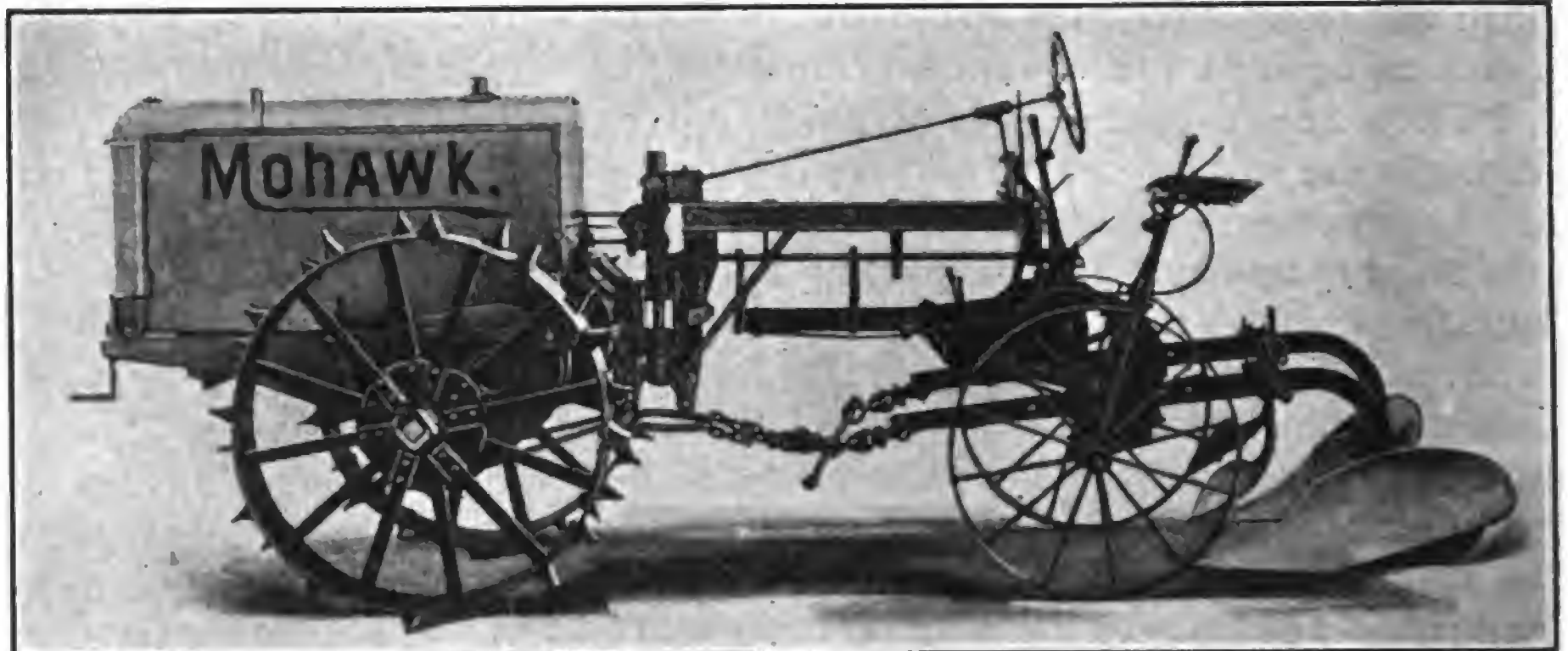
If you make a great bugbear of anything the prospect will probably do the same. If you look at it as the right and natural thing to do, explain it in a natural way and expect it to be easy, it surely will be easier.

Some salesmen say: "I can get my prospects to admit that my goods are right and my prices are right, that they ought to have them, and yet I can't get the men to sign the order." The trouble is that they have left a weak spot somewhere along the line before they came to the closing argument. The final appeal is only one link in the chain. It is a cap to the whole climax of argument or demonstration which has gone before. Do not expect any closing argument to stand by itself and sell your goods. Take a grip on your selling courage and get another start.

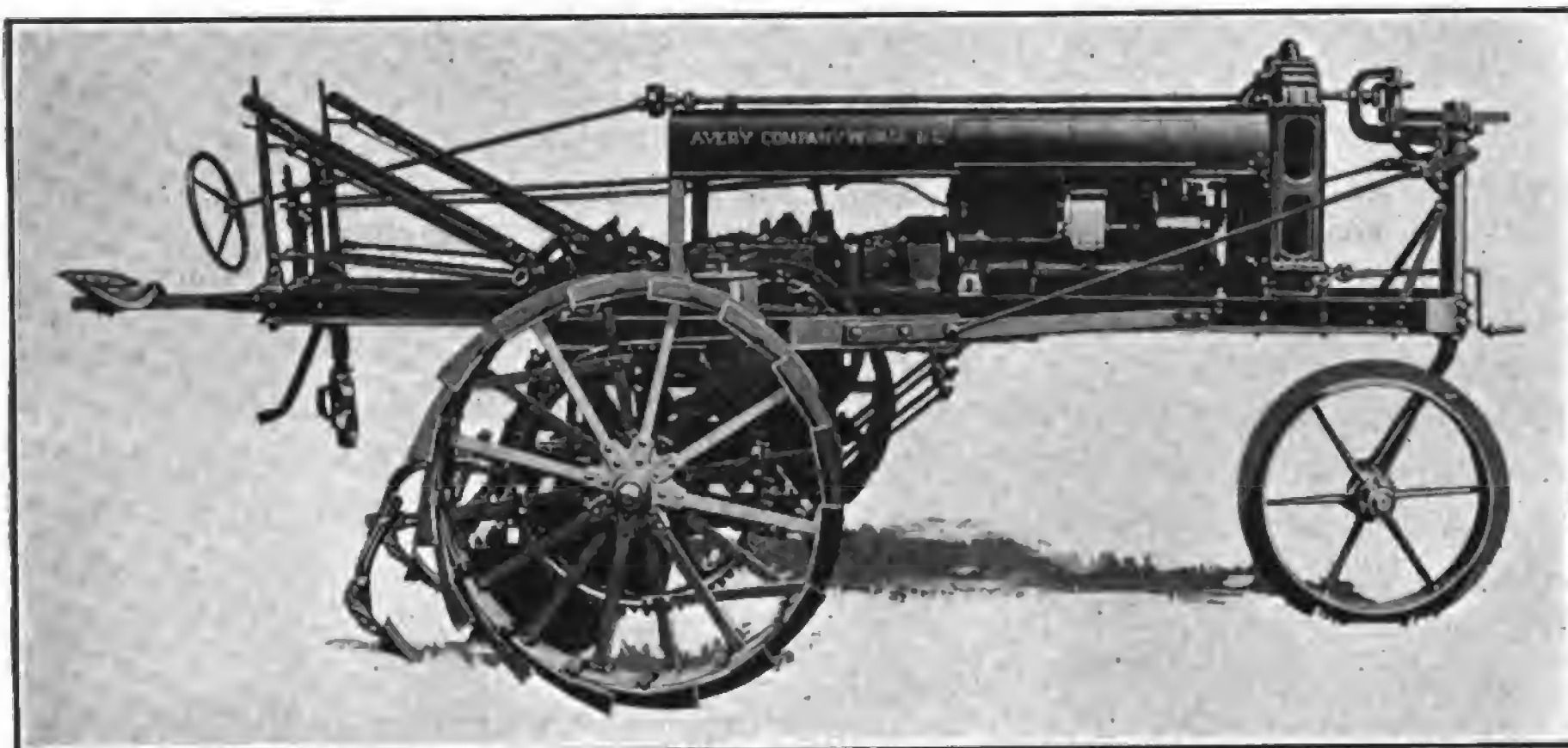
LATE TRACTOR MODELS ON MARKET

MOHAWK 8-16 GENERAL UTILITY TRACTOR.

Engine—Model H, Heavy-Duty Type.
Bore and Stroke— $3\frac{1}{4}$ by $4\frac{1}{2}$ Inches.
Horsepower—Eight at Draw Bar, 16 at Belt, Operates at 1000 R. P. M.
Cooling—Thermo-Syphon with Rex Radiator.
Fuel—Gasoline and Kerosene.
Carburetor—Kingston One-Inch, Equipped with Bennett Air Cleaner.
Ignition—Simms 4-X High-Tension Magneto.
Lubrication—Pump and Splash.
Length Overall—Adjustable.
Height Overall—54 Inches.
Width Overall—40 Inches.
Clutch—Dry-Plate.
Transmission—Spur Gear Type, Enclosed, Oil and Dust-Proof.
Turning Radius—Four Feet.
Final Drive—Enclosed, with Transmission Operating in Oil.



Implements and Tools Which Already Exist on the Farm May Be Readily Adapted for Use with the Mohawk General Purpose Tractor, Manufactured by United Tractors Corporation, Frankfort, N. Y.



Avery Motor Cultivator Designed for General Purpose Service, Manufactured by the Avery Co., Peoria, Ill.



EVERY 8-16 MOTOR CULTIVATOR.

Engine—Avery Four-Cylinder Vertical Type.
Bore and Stroke— $2\frac{1}{4}$ by $3\frac{1}{2}$ Inches.
Horsepower—Five at the Draw Bar and 10 at the Belt.
Cooling—Thermo-Syphon, with Perfex Radiator.
Fuel—Gasoline.
Carburetor—Kingston $\frac{1}{2}$ -Inch, Bennett Air Cleaner.
Ignition—K-W Magneto.
Lubrication—Splash.
Length Overall—148 Inches.
Width Overall—40-44 Inches.
Clearance—30 Inches.
Clutch—Multiple-Disc, Nine-Inch.
Transmission—Avery Sliding Gear, Three Speeds Forward, One Reverse.
Rear Axle—Special.
Final Drive—Sprockets and Chains.

S. O. M. U. A. TILLAGE TRACTOR.

Engine—Four-Cylinder, Vertical Type.
Bore and Stroke— $3\frac{9}{16}$ by $9\frac{11}{16}$ Inches.
Horsepower—35 at 1200 Revolutions Per Minute.
Frame—Aluminum Casting.
Steering—Front Wheel, Mounted on Heavy Springs, with Additional Foot Brakes on Each Driver, to Allow Turning in Six-Foot Radius.
Cooling—Radiator and Belt-Driven Fan of Large Capacity.
Drive Wheels—Cast Steel, with Crimped Rims and Flat Center Band, Allowing Machine to Operate on Road. Detachable Angle Lugs Easily Mounted When Desired.
Tilling Attachment—Made of Shaft or Axle, 60 Inches Wide, Mounting 48 Scraping Tools, Driven by Tractor Engine Through Universal Joint.
Speed of Tiller—At Engine Speed of 1200 R. P. M. Tiller Revolves at from 150 to 175 R. P. M., and Depth to Which It Works Can Be Set to 12 Inches Maximum.



Tillage Tools Attached at the Rear Driven by the Engine Prepare the Soil for Seeding—Sold by Framerman Industrial Development Corporation, 21 East 40th Street, New York City.

A Lesson in Applied Psychology

Wise Sales Manager Demonstrates Folly of Giving Prospect Chance to Sell Himself Out of Buying—Shows How Salesman and Customer Are Influenced Unconsciously by Power of Pessimistic Argument.

THE writer had the recent opportunity of hearing one of the ablest sales managers in Chicago deliver an address at the regular Saturday morning meeting of his sales force. This man, who modestly requested that his name be withheld from any printed comment is a past master of scientific salesmanship.

He has made a thorough study of his profession from the theoretical viewpoint and has proved his theories by a good many years of actual experience. He hasn't a superficiality nor a platitude in his whole system. Superlatives don't go with him and he has absolutely no use for any sales arguments that are not founded on sound logic.

He takes his work seriously and insists that those associated with him do likewise. A salesman, to merit his attention, must be willing to make more than a cursory study of the science of salesmanship. He is willing to go the limit to train conscientious young men who evidence a proper interest in the work, and it very naturally follows that he has built up an unusually productive sales force. His firm handles a high-priced automobile and has recently undertaken the distribution of a truck that also sells at a high price.

On the occasion of the sales meeting referred to, this sales manager spoke for about 20 minutes to a group of 12 men—real salesmen all of them, as the black-



board record ably testified. At the end of his very interesting talk, which was along the lines of general salesmanship, he stressed the folly of greeting the prospect with the stereotyped, "How's business?"

"Whatever you say, don't use that expression when you call on a business man. Say anything else—speak of the weather—anything at all, but don't greet him with, 'How's business,' he cautioned and then, without explaining the unusual

RETAILING PESSIMISM.

This article illustrates in striking manner how easy it is for the pessimist to sell his wares. It also shows that while he peddles a mighty poor article he has no trouble in making a lot of sales. This isn't because of his superior salesmanship; rather it is because he works by underhanded methods. Watch out for the crepe hanger. Get the jump on him and sell him some optimism. He'll give in to enthusiasm. Remember that "Reaction is equal to action in the opposite direction."

remarks which concluded his talk, turned to go to his seat.

Immediately he had sat down a hand shot up. "I'd like to know just what your last remark meant," asked one of the younger salesmen. "Why shouldn't we say, 'How's business,' when meeting a customer?"

"Good for you," laughed the sales manager. "I was waiting for that question. I'll answer it by asking another. What's the first thing a man says when you go into his office and say, 'Good morning, Mr. Brown, how's business?'"

"Well—," mused the salesman, "chances are he'll say it's rotten. It is with the mos—"

"That's the idea exactly," interrupted the sales manager. "He'll answer your question literally won't he? He'll say that business is poor. The next thing he'll do will be to tell you why it is poor." The salesman nodded. "Then he'll tell you how he would go about it to make for better conditions.

"'How's business?' you say, in exactly the same stereotyped way you would say 'Good morning.' You're not asking a question, merely greeting him. It's simply a salutation—a matter of habit on your part. He knows it, too, but instead of answering you in kind, he'll take you literally and tell you a great, long rigamarole about crops being poor, state is having a tough year, farmers' mortgage'd heavier than ever, and so forth.

"He'll tell you that the United States would be passing through the greatest panic in its history if it wasn't for the Federal Reserve banks. 'Mark my words,' he'll wail—'this country won't be in any shape at all until they get the dollar back to the point where it's worth 100 cents. Furthermore, there'll be no export business until we get the gold bal-

ance somewhere near right so that foreign countries can do business with us.'

"He'll run on—if you let him—in this manner for an hour—tell you about our prosperity being founded on our export of raw materials just as Germany depends on her exports of manufactured goods. Then—about this time he'll get started on the cotton situation in the southwest. He'll tell you about the acres of bales of cotton for which there is no sale because of the tire situation—he'll go through the whole gamut of conditions real or fancied.

"He's a press agent for pessimism, and, incidentally, he gets the poorest pay of any publicist in the world. And now, since he is supposed to be a sensible, hard-headed business man, why is it that he has handed you this line of talk?" asked the sales manager.

The salesman hesitated a moment. "I don't know—exactly," he finally admitted. "But I'll say that you have scored a bull's eye with me because I've stacked up against those kind of people time after time. I had one in particular the other day. He was rabid. Gave me the tearfullest lecture I ever heard."

The sales manager nodded. "The reason the prospect talks to you in that manner is because you have invited him to. A hundred other salesmen have called on him within the month perhaps and have unconsciously given him the



same opportunity to lecture to them by greeting him in the manner referred to, with the result that the prospect gets to thinking that his opinion is being asked for. He has gotten so used to pall-bearing that he simply can't help going through the whole speech whenever the opportunity presents itself for him to do so.

"But that wouldn't be so bad if these sob-sisters harmed no one but them-

selves. For instance," turning to the salesman, "just to illustrate what I mean. You say you ran into the same kind of a prospect that I speak of the other day. Did you sell him?"

"I should say not," grunted the salesman. "That bird wasn't buying gold dollars for Chinese money. I never saw such a crab in my life, although I run into some pretty sad ones nearly every day."

"Why didn't you sell your man?" asked the other.

"Why—well; he simply wasn't buying," answered the salesman. "He was pleasant enough when I went in first, but when he got started in on bad business it was all off. By the time he got through he had me feeling the same way."

"Exactly," nodded the sales manager. "That's just the point. You didn't sell him, but he sold you. That's where these hearse-riders do the most harm. You not only allowed that prospect to sell himself out of buying, but you unconsciously allowed him to sell you that business was bad. He sold you on pessimism. The fact that he did it by unconscious influence is what worked the harm, because, had you realized just what was happening you could easily have combated it. As it was, I'll bet you felt the effects of that lecture all the rest of the day and didn't realize what the matter was. Am I right?" he asked, glancing at the salesman for corroboration.

"You certainly are," admitted the salesman in a straight-forward manner. "I hadn't thought of it in that way, but that's just the reason I didn't make a productive call that day."

The sales manager smiled. "I don't blame you at all," he said reassuringly. "We've all been through the experience. And now let's see if there isn't a good way to combat the wiles of such coffin-toters."

"The first thing to do is to get the jump on the prospect. Use a little of his own 'unconscious influence' stuff on him. Get him to thinking your way, but handle him carefully and don't hand him a bunch of superlatives right off the bat."

"Don't breeze in and say, 'Good morning, Mr. Jones, business is fine,' because he'll feel that you have insulted his intelligence. Doesn't he know that business is poor? Hasn't he been preaching it long enough? He forms his own opinions, and you've got to influence him to believe as you want him to without having him realize that you are directing his thought in any way."

"The good advertising writer has this idea down to a science. He doesn't say right out in plain words that his product is 'the best' or 'the biggest.' He knows that those methods are puerile and deceive no one but himself. What he strives to do is to tell you his story in such a way that you will unconsciously believe he is writing of a superior product; that his article is really better than the ordinary."

"He keeps away from the direct superlative, and the first thing you know he has created the impression of superiority in your mind and nothing on earth can make you think differently, for the very

simple reason that you believe that you have formed your own opinion; and, naturally enough, a man has faith in his own judgment."

"That's exactly the way for the salesman to handle his prospect, especially at the present time when all industry is passing through a readjustment period. Tell him a few pregnant facts; show him how well registrations are shaping up as compared with last year. Prove to him that the recent price stabilization has

WHY THE SALE FLIVVERED.

1.
"Prospect too busy."
2.
"Wasn't interested in our proposition."
3.
"Just bought another car."
4.
"Paid income tax—no money."
5.
"Out, will see again."
6.
"Bought stock—no ready funds."
7.
"Will buy later."
8.
"Wouldn't decide now."
9.
"Waiting for a drop in price"
10.
"Isn't buying anything."

These are only 10 of the reasons given to the boss to account for the loss of the sale. There are 100 other excuses, just as good, few of which are true. The real reason the salesman didn't make the sale is because he allowed the prospect to sell him, instead of selling the prospect.

meant good business to the automobile dealers. The first thing you know you'll have an interested auditor who will be in a receptive mood. He will listen to your proposition because he is just as human as you are, and you have so directed his judgment that he firmly believes for the moment at least that business is pretty good and that now is as good a time as any to purchase a car.

"Therefore, whatever you do—and I've explained why," said the sales manager, looking at his watch, "don't give a prospect the opportunity to get the jump on you by asking him 'How's business?' The economic conditions imposed by modern environment make it necessary that we get a profit from our paid employees," he laughed, "so for heaven's sake don't let these proselyting pessimists make an audience out of you."

TRUCKS FAVORED BY LIVE STOCK RAISERS.

A. F. Stryker, secretary and traffic manager of the Omaha Live Stock Exchange, in testifying at the freight rate

hearing on live stock before the Interstate Commerce Commission in Chicago during the week of June 13, stated: "The high freight rates are forcing live stock producers to ship by truck. Twenty per cent. of the hogs in one day's receipts at Omaha were delivered by truck. On Monday, June 6, fifty per cent. of the sheep received at the St. Joseph market came by truck."

It is estimated that more than 3,000,000 head of cattle, hogs and sheep will be transported by motor truck direct from "farm to yards" during 1921, this being based on 1920 figures from 17 stock yards in the corn belt.

It is predicted that if it were possible to get the actual figures covering the number of head transported by truck from farm to rail siding and then by rail to stock yards as well as the number of head arriving by motor truck at the dozen of smaller stock yards where no record is kept on stock arriving in this manner the grand total for 1921 conservatively estimated, would surely reach 6,000,000.

In commenting on this conclusive evidence of the adaptability and dependability of the motor truck for raisers of live stock, F. S. Spencer of the Spencer Reed Co., Kissel distributor, states: "The use of the motor truck in transporting live stock has a number of economical advantages, such as being the quickest and the cheapest method of delivery, because it prevents shrinkage to a large degree. This is especially important in 'farm to railroad siding to yards delivery' because a freight car may not be spotted for several days after it is ordered, consequently the producer can keep his stock on his farm until a few hours before the car is set for loading. This ability of the motor truck for speedy delivery eliminates the necessity of the stock waiting in the loading pens, which should always be avoided if possible."

Charles Copeland, assistant treasurer, has been elected a member of the board of directors and secretary of E. I. duPont de Nemours & Co., to fill the vacancy caused by the death of Alexis I. duPont. Mr. Copeland has been assistant treasurer of the company for 18 years. His connection with the explosives industry began several years earlier when he became assistant to J. A. Haskell, then president of the Lafin & Rand Powder Co. He served also as assistant treasurer of the Eastern Dynamite Co. and of the Lake Superior Powder Co. On the consolidation of these companies with the duPont Co. he assumed the position which he is now leaving for his new work as secretary of the company.

D. F. Hulgrave has been appointed manager of purchases for the Cadillac Motor Car Co. in Detroit. He succeeds J. H. Main, who has just been appointed director of the purchase section of the advisory board for the General Motors Corporation, with offices in Detroit. Mr. Hulgrave has served a total of 13 years with Cadillac, the last three years being as assistant to Mr. Main.

Ohio Tank Bodies Extensively Used

Special Tanks Required in Delivery of Oils—Many Improvements Embodied, Solving Distributing Problems—Oil Companies Are Users of This Equipment

MAKING oil tank bodies, today, has reached a high state of perfection and the number of companies which are manufacturing this type of body, all state that they have had several problems to solve before the tanks have been developed to the high state of perfection as we find them at the present time.

The transporting of liquids, such as gasoline, kerosene, oils, etc., presents problems that earlier tank manufacturers tried to solve through their engineering departments. Some succeeded and have been able to get a large amount of business from the many oil companies, including the Standard Oil Co., and its various subsidiaries, throughout the country, and many other independent companies.

The Davis Welding & Manufacturing Co., successor to the Ohio Welding & Manufacturing Co., Cincinnati, O., is one of the few which were able to cope with the serious problems that beset the tank truck builders. Today their gasoline and oil tanks are known in all parts of the country.

The surging of the liquid in the tanks is prevented by a double partition which separates each compartment. The heads of the tank are welded by the oxy-acetylene method, as are also the double partitions. The tank outlet at the bottom of each compartment overlaps the edge of the nipple and is welded to it, making a solid unit of a sufficient depth so that all liquid is drained from the compartment. Quick-acting shut-off valves fit these openings, while a rod connects the valve with an eccentric handle on top of the tank by which the driver is able to shut off each individual compartment and prevent the liquid from leaking while being transported on the road.

This latter device is especially valuable in case of fire, as the compartments can be kept shut off and only the vapor of the liquid allowed to escape, and that through the vents on top of the manhole covers. Ohio tanks have been known to go through fires without harming the contents, even though the units of the chassis and mounting were badly burned. The position of the control handle of the Ohio shut-off valves is unique in that it occupies a certain position when closed and the opposite when open. This feature is of particular value to the yard man, as he can tell at a glance whether the drivers are hauling the liquid with the valves closed or open and deal with them accordingly.

Special Tank Mounting Required.

Still another problem that had to be solved was that of mounting the tank on the chassis in such a manner that it would stay tight and would not chafe. To solve this it was required that the

engineers devise some form of tank mounting that would eliminate this trouble, lower the center of gravity of the body, and form a support for the can rack at the rear.

In the Ohio tank body this has been solved by constructing a special mounting composed of cross members of wood fastened securely to steel side members which in turn are fastened to U clamps to the frame of the truck chassis. The rear end of the frame is extended back and forms a bumper at the rear of the tank spouts and can hooks, preventing accidental damaging of the spouts.

The rear extension also forms a bed on which is placed the steel, wood-lined can cabinet or rack in which is stored the carrying cans used in delivering small quantities of oil.

Tanks are made by this company for any size or capacity of truck as well as storage tanks for underground and above ground storage of inflammable liquids.

Many of the large refinishing and distributing companies throughout the country are numbered among the customers for Ohio tank bodies, and the company states that they expect a very good year's business.

TRACKLESS CARS WILL GET TRIAL IN JACKSON.

JACKSON, MICH., Aug. 12.—Within a month Jackson will have in operation a trackless trolley line. It will be operated by the Michigan United Railways, which owns the present street railway system. The trackless trolley will run into one of



Type of Oil Distributing Tank Body Mounted on Motor Truck Chassis Built by the Davis Welding & Manufacturing Co., Cincinnati, O.

Mud guards cover the side members of the mounting, and also the rear end, preventing mud from covering the sides of the tank or the steel, wood-lined box at the rear.

Statement is made that a clean-looking tank delivery system counts for as much in the oil delivery business as it does in any other line, and that it is just as important to give attention to this minor detail.

Wooden doors, backed by steel, mounted on hinges, enclose the rear of the steel-wood lined cabinet, protecting the cans from dust.

The man holes on top of the tank compartments are 14 inches in diameter, are made of cast iron and fitted with lugs for removing and replacing the cover, which are removed with the aid of an iron bar. Extension rods pass downward into the tank, the bottom end gauging the capacity of the tank and determining the proper height at which the compartment should be filled.

the factory districts which has had no street railway lines and will accommodate 2000 working men. If it proves a success the service will be extended to other portions of the city now without transportation service.

NEW OFFER FOR MUSCLE SHOALS.

WASHINGTON, Aug. 11.—A new offer to purchase the government nitrate plant at Muscle Shoals, Ala., for which Henry Ford has submitted proposals is expected by the government, Secretary Hoover said today, from a power company he did not name. The secretary indicated the government's decision on the Muscle Shoals proposition was awaiting the arrival of the new offer.

B. F. Page, formerly manager of the truck department of the Maxwell Motor Sales Corporation, has been appointed supervisor in charge of the Omaha district for Maxwell-Chalmers

Adds to Cletrac Efficiency

ATTACHMENTS PERFECTED, WHICH GREATLY ENHANCE VALUE OF MACHINE—NEW RUBBER BLOCK TRACK EMBODIES PRINCIPLES OF TRUCK TIRE BUILDING

THE popularity of the Cletrac tractor is shown by the many lines of work in which it may be used. Many owners have found that attachments could be added to the machine which would increase its field of usefulness and additional farm work could be done which was formerly considered necessary to do with horses.

The possibilities in the way of attachments to this tracklaying type of tractor seem to be unlimited and there is hardly a week that passes in which some bright mind does not develop some new hitch, attachment or device which tends to further increase the field of its usefulness.

The light weight of the tractor and its method of driving through a movable track, adapt it to many uses on the farm and in industrial plants that were formerly thought impossible to serve with a tractor.

Line Drive Control for Cletrac Tractor.

The Cleveland Tractor Co., Cleveland, O., manufacturer of the Cletrac Tank-Type tractor, announces the perfection of a line drive attachment for either the Model H or Model W Cletrac.

This is in accord with the general trend of the times, and meets the demand for a control mechanism which will permit the operator to "ride the road." It makes a one-man outfit of the tractor coupled with almost any farm implement. While the greatest use to which the Line Drive will be put is in connection with the grain binder, it is also employed in seeding, manure spreading, mowing and many other farm jobs.

In operating with the Line Drive the tractor is handled exactly like a team of horses. The tractor is guided by a pair of lines and stopped by pulling on both lines at the same time. An extra pull on one line throws the gears into neutral and the lines may then be released while the outfit is standing idle. In starting,

both lines are pulled back, an added pull on one line throws the gears into mesh and, when the lines are slackened, the clutch becomes engaged and the tractor moves forward.

The attachment makes use of the standard steering post and clutch throw-out, and after it is installed the tractor may be handled, either from the drawn implement or from the seat of the tractor, without change or adjustment.

The operation is simple and positive, and makes the tractor a still greater labor saver on the farm. This is another mechanical improvement that comes direct from the experience of the user, the attachment having been invented and developed by a Cletrac owner for his own farm.

Cletrac Rubber Block Tracks Are Built Like Truck Tires.

The increasing use of tractors for industrial haulage, particularly in warehouses and plants where grouters and lugs would injure the floor, has led to the design of a new track for the Cletrac, the Tank-Type tractor, which embodies the best known principles of solid truck tire building.

As will be seen from the illustration, each shoe of the track assembly is made up of two units—first, a solid block of rubber, especially compounded for severe service, which is vulcanized to a section of standard truck tire channels, and second, a track shoe so designed that the rubber block and channel section is bolted to it securely.

The two bolts are keyed into the channel and vulcanized into place when the rubber block is put on. This construction permits the replacement of the tread without replacing the track. The rubber block extends a full 1½ inch above the tire channels, greatly increasing the life of the tread and reducing maintenance expense.

Each block has a floor contact surface of three by six inches so that the actual pressure of the tractor is not more than 14 pounds a square inch.

This new track, which was perfected by the engineers of both the Cleveland Tractor Co. and the Goodyear Tire & Rubber Co., in collaboration, makes the Cletrac an efficient and economical plant haulage unit.

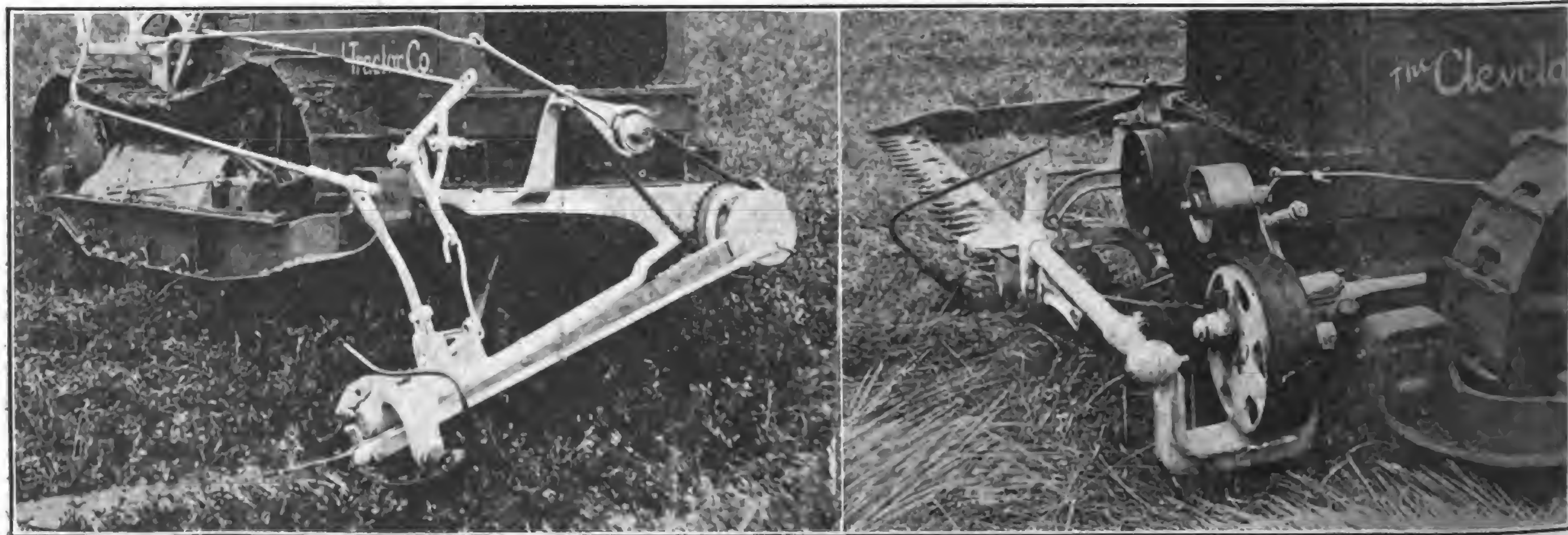
Special Tractor Mowers for the Cletrac.

Taking advantage of the peculiar design of the Cletrac tractor, which lends itself to the application of special tools for use over a rather wide range of topographical and soil conditions, two different companies have designed and built mower attachments for this tractor. One of these was designed by G. C. Willis, the designer of the Willis-Flack guide for the Cletrac. The Willis pivoted-bar tractor mower is manufactured and distributed by the Hullett-McCurdy Tractor Co., Kansas City, Mo., which is also distributor for the Cletrac tractor in that territory.

The Pacific coast country saw the need at about the same time and the Zanon Mower attachment was designed by Remo C. Zanon, and is manufactured by the Power Implement & Machine Works, Modesta, Cal.

Both of these machines take their power from the tractor belt pulley shaft at the front of the tractor. The Willis mower makes use of the pulley and operates the pitman by means of a leather belt. The tension on the belt is maintained by an idler which is controlled from the driver's seat. The Zanon attachment replaces the belt pulley with a sprocket and uses a chain drive with clutch control.

Both machines use standard make cutter bars, sickles and pitmans, the Willis using McCormick parts and the Zanon having a Walter A. Wood bar. This in-



Left, Zanon Mower Attachment Installed on Front End of Cletrac Crawler Type Tractor; Right, Willis Attachment Making Use of Belt and Pulleys Driving Pitman Rod of Mower Attachment, Cletrac Tractor.

sures convenience for the owner in securing replacement parts.

Control levers at the driver's seat provide for tilting the cutter bar for raising or lowering the guards, and for lifting the bar over obstructions. The bar, on the attachment, is semi-floating, adapting itself to any irregularities of the ground, and being independent of any up or down motion of the tractor. The bar is held rigid in a vertical position when not in use, as when moving from field to field.

The clutch on the Zanon mower acts as a safety device which eliminates the breaking of the sickle blades or pitman rod when the mower picks up stones or other obstacles.

A special feature of the Willis mower is the pivoted bar, which is so attached that in case the bar is driven against an unyielding object, the shearing of a wooden pin allows the bar to swing around parallel with the tractor, and at the same time stops the sickle by raising the belt idler pulley.

Either of these attachments can be fitted to the Cletrac tractor without drilling additional holes. When the tractor is to be used for other work for a short time, the cutter bar alone is removed.

Mower attachments mark a distinct advance in power farming equipment. Formerly it was necessary to draw the mower back of the tractor and have a man on the mower as well as a second man on the tractor. The use of the mower attachment now makes the tractor and mower a one-man machine. The driver is in a position to watch and control the cutter bar at all times as well as to operate the tractor.

The position of the cutter bar at the front of the tractor makes it possible to run into close places, cut around trees, stumps and where horse-drawn machines cannot conveniently operate.

The short turning radius of this tractor, and its light tread, make it an ideal combination for all kinds of conditions. Ample power is provided, and the speed of the sickle, with reference to the forward motion of the tractor, is so regulated that it makes no difference at what speed the tractor may run, the knife makes a clean, smooth cut. The best of



One-Man Control of Cletrac Tractor and Binder Helps Solve Labor Shortage.

materials are used in the construction of the attachments, and there is ample strength for cutting even the toughest wire grass.

Using a six-foot cutter bar it is possible, the manufacturer states, to cut from 10 to 20 acres per eight-hour day, depending upon the nature of the ground. Because speed and power are so essential in mowing, this has always been a difficult job for horses. Tractors, thus far, have not been adaptable to this type of work for two reasons namely, the fact that tractor wheels tend to crush freshly cut grass into the ground, and the necessity for two men to operate the outfit. The light tread of the Cletrac tractor eliminates the first reason and the introduction of the mower attachments eliminates the latter.

Mowing the right of way on railroad property and road sides, cutting cover crops in orchards, etc., are special jobs for which these outfits are being used in addition to their general farm work.

PARTS MAKERS CREDIT CONVENTION IN DETROIT.

Announcement has been made by M. L. Heminway, general manager of the Motor and Accessory Manufacturers' association, that this year's credit convention

will be held at the Hotel Statler, Detroit, Mich., Wednesday, Thursday and Friday, Sept. 14, 15 and 16.

The tentative plans call for a comprehensive and vital programme of papers and discussions, built around the central theme, "Bringing the Automotive Industry Back to Normal."

E. H. Broadwell, president of the association and vice president of the Fisk Rubber Co. will preside at the convention.

Detroit was selected as a place of meeting this year because of its convenience to the great majority of the 400 companies affiliated with the association.

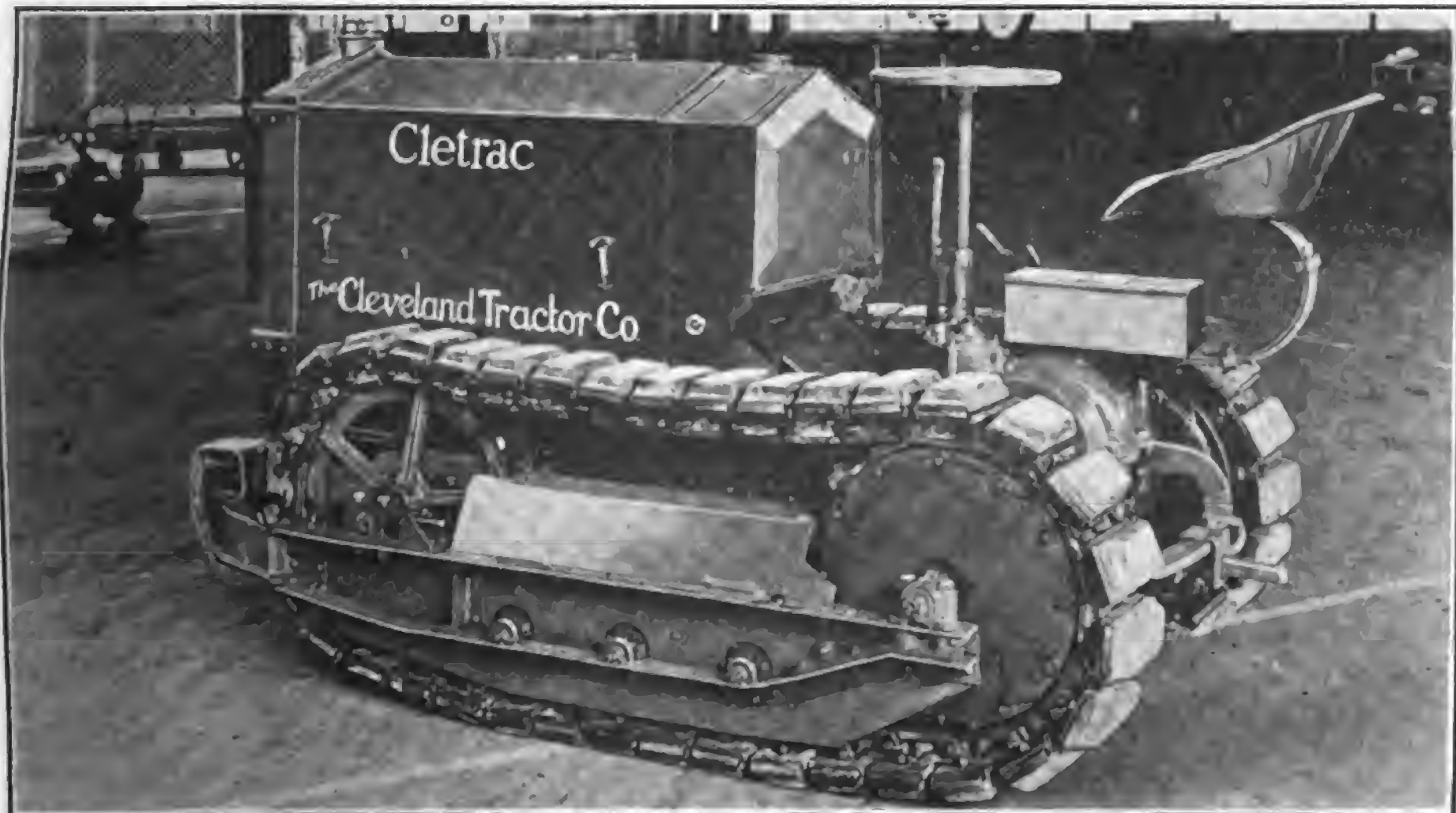
Speakers of national importance from the automotive industry and from industrial, banking and governmental circles will be scheduled for the programme.

The annual credit convention of the Motor and Accessory Manufacturers' association is usually regarded as one of the industry's most significant gatherings, for there the credit managers, financial directors and general executives of the unit and equipment manufacturers exchange comments and experiences on current conditions and future prospects for the automotive field. This survey, based on the pooling of facts and dollars and cents figures and conducted in the form of a symposium or open forum, affords a scientific and authoritative view of automotive conditions.

Last year's credit convention was of far-reaching importance, for at that conference Governor W. P. G. Harding of the Federal Reserve Board, Washington, officially announced that the Federal Reserve system was not authorizing or encouraging discrimination against automobile paper. This announcement made a strong impression in financial circles and had a reassuring influence.

ANTHRACITE TRADE BOOMS.

WILKES BARRE, PA., Aug. 15.—The anthracite coal industry has been booming throughout the spring and summer and a full time schedule is ahead for fall and winter. The anthracite belt has been one of the few prosperous spots in the country and with mills and factories preparing for reopening a war-time wave of prosperity will result.



Rubber Blocks May Now Be Obtained Which Equip Cletrac Tractor for Industrial and Road Hauling—This Equipment Prevents Crawlers from Damaging Floors in Industrial Plants or Asphalt Surface of Highways.

Multiple Shaper May Revolutionize Gear Cutting

SPECIAL TOOL HEAD SAID TO SOLVE IMPORTANT PROBLEM THAT HAS LONG INTERESTED ENGINEERS—NEW MACHINE ATTAINS GREAT SPEED—IS ACCURATE—MANUFACTURED BY STEVENSON GEAR CO., INDIANAPOLIS, IND.

THE Stevenson Gear Co. of Indianapolis, Ind., has recently developed a new and improved type of gear-cutting machine known as the Stevenson Multiple Shaper. This machine differs from the usual type of gear-cutting machines in that it cuts all or a multiple number of teeth in a gear or a similar product at one operation, as distinguished from cutting one tooth at a time, as is ordinarily done on standard machines.

The essential member of the machine is a special tool head which consists primarily of a series of radially disposed tools spaced about the circumference of the blank to be cut.

This machine operates in the same manner as an ordinary vertical shaper, except that the tools are held stationary and the gear blank is reciprocated past

gear blanks is not made solid with the ram, but fits in a socket in a spindle which is journaled inside the ram and is free to rotate independently of the reciprocating motion imparted to it by the ram. An intermittent indexing movement is imparted to the spindle after each cutting stroke by an intermittent gear train. The machine is seven feet high, weighs

the tooth. At the completion of each stroke of the ram and before the next cut begins, the gear blank is indexed a space equal to one tooth, thereby presenting a different tool to each tooth from the one which made the previous cut. After the tools have been fed in to full depth, they are held stationary in that position while the cutting process continues until the gear has indexed one complete revolution, thereby giving each tool an opportunity to take one last cut on each tooth. This final complete index insures a uniformity of spacing of the teeth in the gear equal to that of the indexing mechanism. Uniformity of the tooth form is secured even though the tools themselves may be far from uniform, for it is at once apparent that if any tool is longer or wider than any other tool, even though it be only a thousandth of an inch, that portion of it which is longer or wider will take one last cut on the corresponding portion of each tooth in the gear, thereby eliminating any variation which may have been caused by previous cuts. By this process of finishing all the teeth of a gear with a single finishing tool, this machine attains great accuracy and the speed is multiplied by the number of tools operating on the gear blank at one time.

Tool Head an Interesting Mechanism.

To technical men the most interesting individual mechanism on this machine is the tool head, as it involves the solution of the most interesting and important problems, both in design and construction. In the three illustrations of the tool head, Fig. 2 is a top view of the tool head as it would appear when in operation on the machine. Fig. 3 is a bottom view as it would appear when taken off of the machine ready for disassembly or adjustment. In Fig. 4 the tool head is partly disassembled and shows the principal details of the mechanism. When it is mounted on the machine, as in Fig. 2, the only working parts to be seen are the points of the tool bits surrounding the gear blanks and the small depth adjustment dial seen in the upper part of the illustration. The four pairs of T slots seen in this illustration are for attaching a piloting device which is used on extremely long and slender arbors which may need an outer support. Two tool heads are provided for each machine and

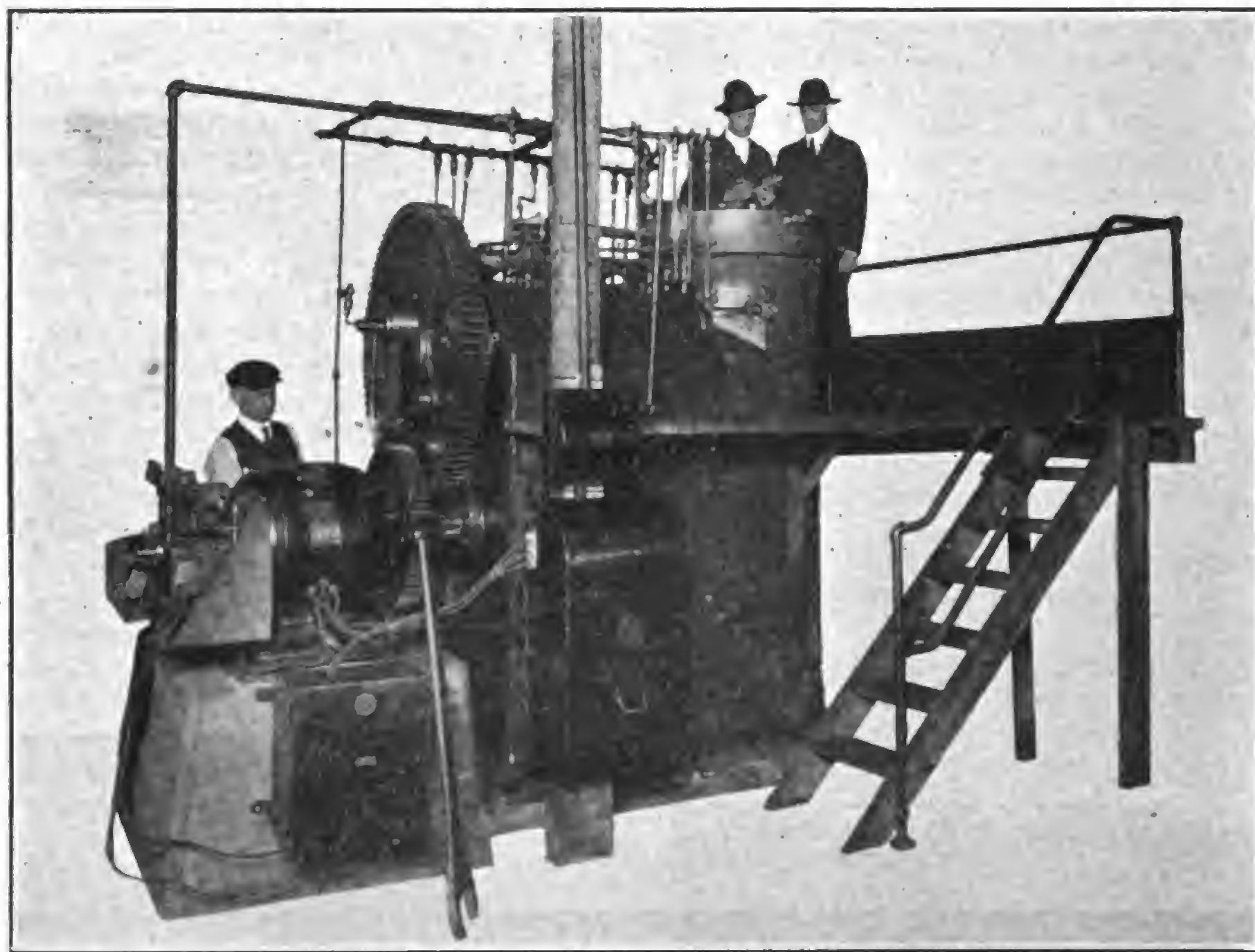


Fig. 1.

the tools. The mechanism of the machine consists essentially of a ram carrying a blank supporting arbor and the multiple tooled head for operating upon the blank. The frame of the machine is a casting of rectangular box section with a vertical cylindrical portion at one end. The ram is mounted in the center of the cylindrical part of the frame and the tool head is mounted above the ram at the top of this portion. The crank shaft which drives the ram is journaled near the top of the rectangular section and is provided with an adjustable crank head at the end next to the ram and is driven through back gears by an individual electric motor. The arbor which carries the

17,000 pounds and when operating to full capacity is driven by a 100-horsepower motor. Its capacity is for gears 12 inches in diameter, six-inch face, four diametral pitch.

The tool head consists essentially of a flat, steel disc three feet in diameter, provided with a hole at the center and a number of radial grooves cut in its face in which the tool bits are arranged like the spokes of a wheel about the circumference of the gear. Successive feeding movements are imparted to the tools by an annular sectional cam ring. As the gear blank is reciprocated past the cutting tools, the tools are gradually fed in by successive cuts to the full depth of

while one is in use on the machine, the tools of the other are being sharpened and reset ready for use after the tools in operation begin to dull. The tool head is held in place by eight studs and nuts shown in the illustration. When it is desired to set up a new job or to sharpen the tools, these eight nuts are taken off and the tool head is lifted off of the machine bodily and is replaced by the other tool head. This arrangement permits the machine to operate practically continually with very little loss of time on account of set-up and sharpening tools. As the tool head is taken off of the machine it is turned bottom side up on trunnions as shown in Fig. 3. The clamp gear and plate are then removed, exposing the tools and feeding mechanism as in Fig. 4.

Tool Bits Rectangular in Section.

The tool bits shown in Figs. 4 and 5 are rectangular in section except the lower side, which is in the form of a V. The gear tooth profile is formed at the inner end of this tool and is backed off to permit sharpening without changing the form. The outer end of this tool rests against a spiral cam surface and is ground in the form of an exact radius. A small pin near the back end fits in a groove, which has an opposing spiral surface and retains the tool in close contact with the other cam surface to insure correct contact at all times as well as to withdraw the tools to their starting position after the cut is finished.

The individual cam lugs are mounted on a large ring which encircles the tool

idler gears seen in the lower part of Fig. 4 and are produced by a feed mechanism which will be explained.

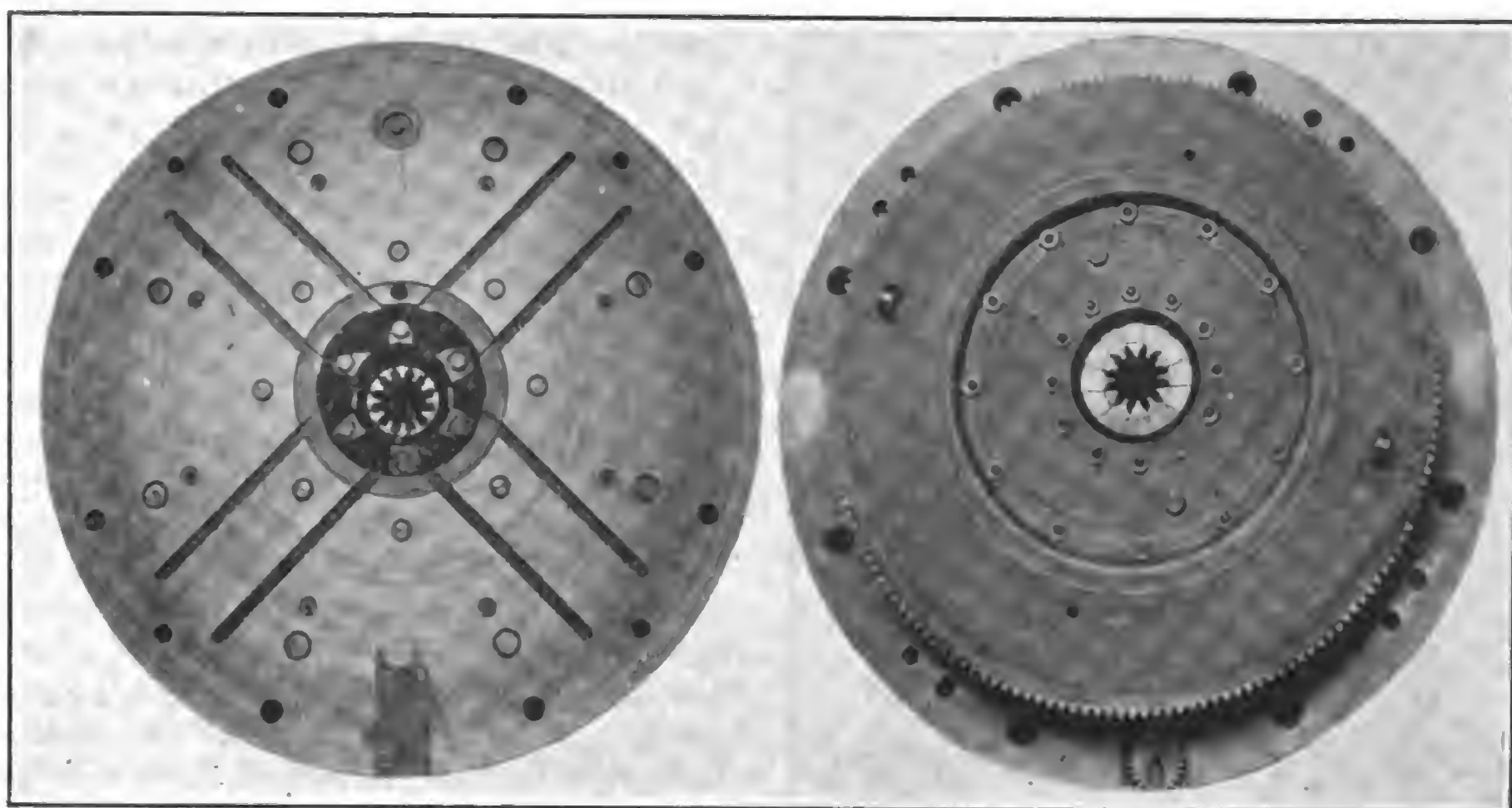
The final depth to which the tools are fed is determined by an adjustable stop which positively limits the rotary feeding movement of the cam ring. This feed mechanism being spring actuated, the position of the depth controlling stop can be varied within reasonable limits without resetting of the feed mechanism. This is particularly desirable during the operation of the machine in cases where the tool bits may not have been set to exactly the right depth in the beginning or in cases where the keen edge wears off of the tools and they begin to cut gears that

feeding movement is imparted to the cam ring and before the beginning of the cutting stroke the forward feeding movement of the cam is made great enough to compensate for the slight retraction for relief and also to provide the necessary additional feed for the depth of the next cut.

The large gear and plate shown in Fig. 3 are used to intermittently clamp and release the tool bits during the cutting and feeding operation. The lower central plate is mounted directly above the tool bits and is provided with adjustable set screws and lock nuts above each tool. The outer gear member is free to rotate about the central plate and is provided with screw threads which engage a corresponding threaded portion of the tool head base. A rotary reciprocating motion imparted to this gear by a cam operated segment clamps the tools during the cutting operation and releases them during their relief and feeding movements. This clamping arrangement, by forcing the V-shaped seat on the tool bit into a corresponding V-shaped seat on the spacing plate in the tool head, serves to centralize and accurately locate the cutting point of the tool and in addition to take up all clearance and looseness so as to eliminate vibration and chatter.

Feed and Clamping Mechanism.

The feed and clamping mechanism, shown in Fig. 6, comprises the segments and cams for actuating the tool head feed cam and the tool clamping gear. The feed cam segment, which is shown near the center of this illustration, swings about the central stud as a fulcrum and is moved directly by a spiral cam. This cam is rotated intermittently by a ratchet on which it is mounted and can be adjusted to produce various feeding motions. It can be seen from the illustration that this cam has a long, gradual slope for the feeding movement and a sharp descent for quickly returning the tools to their starting position at the completion of the cutting operation. The slight retraction for producing the relief movement is accomplished by mounting the fulcrum stud eccentrically on a shaft which is given a partial rotation by a face cam on the large driving gear. The tool clamping gear segment, seen in the lower part of the illustration, is actuated directly by a push rod in contact with an-



Figures 2 and 3.

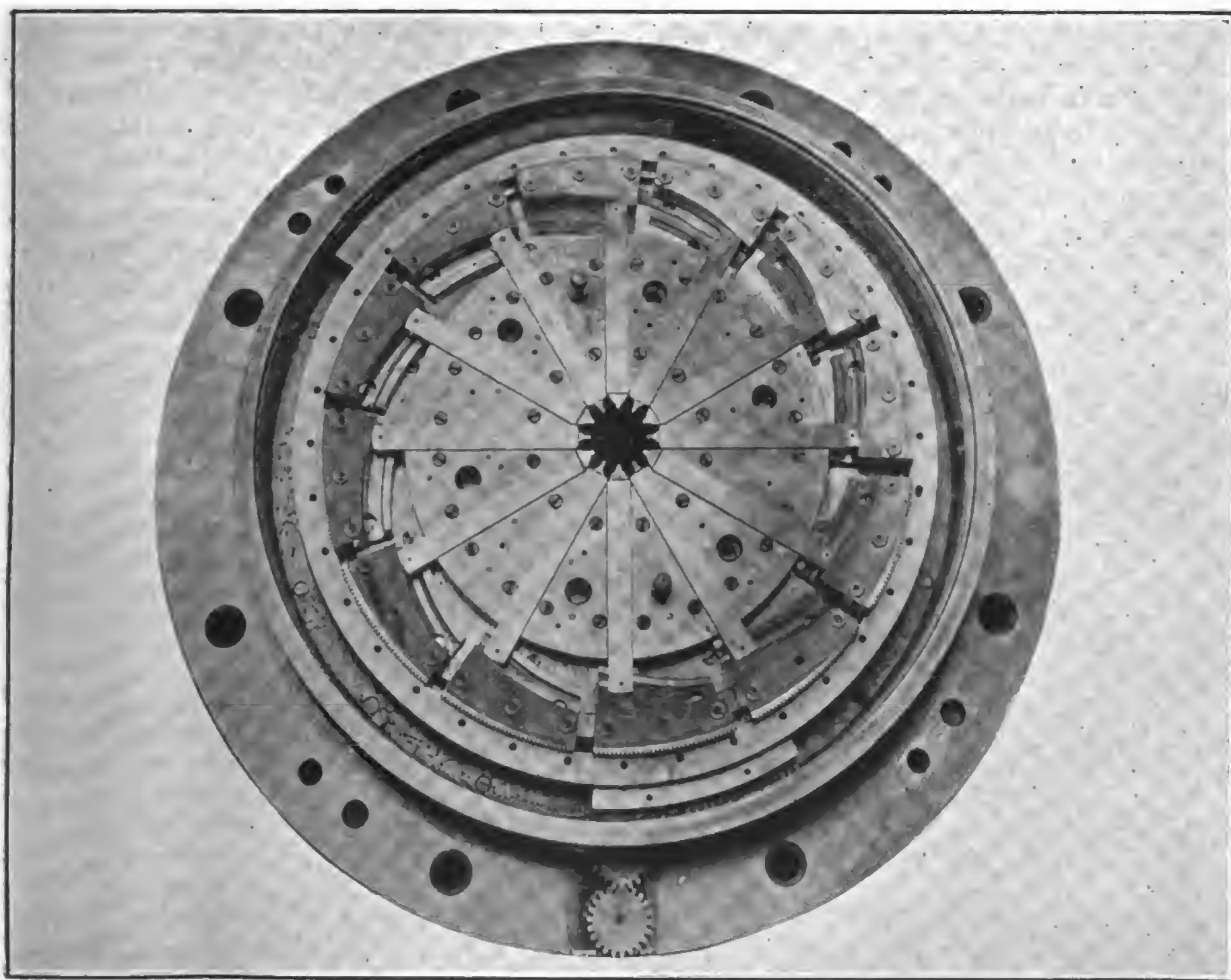


Fig. 4.

bits and spacing plate and are held down by T bolts which fit in a circular T slot in the ring. The tool bits are adjusted for depth independently by moving these cam lugs individually along the T slot relative to the cam ring and each other. Simultaneous feeding movements are imparted to the cam ring through the two

are uneven or oversize long before they are actually dull. The dial which controls this adjustment is seen in the upper part of Fig. 2 and can be reset within less than a minute's time whenever the operator desires.

In order to provide relief for the tools on the back stroke of the ram, a reverse

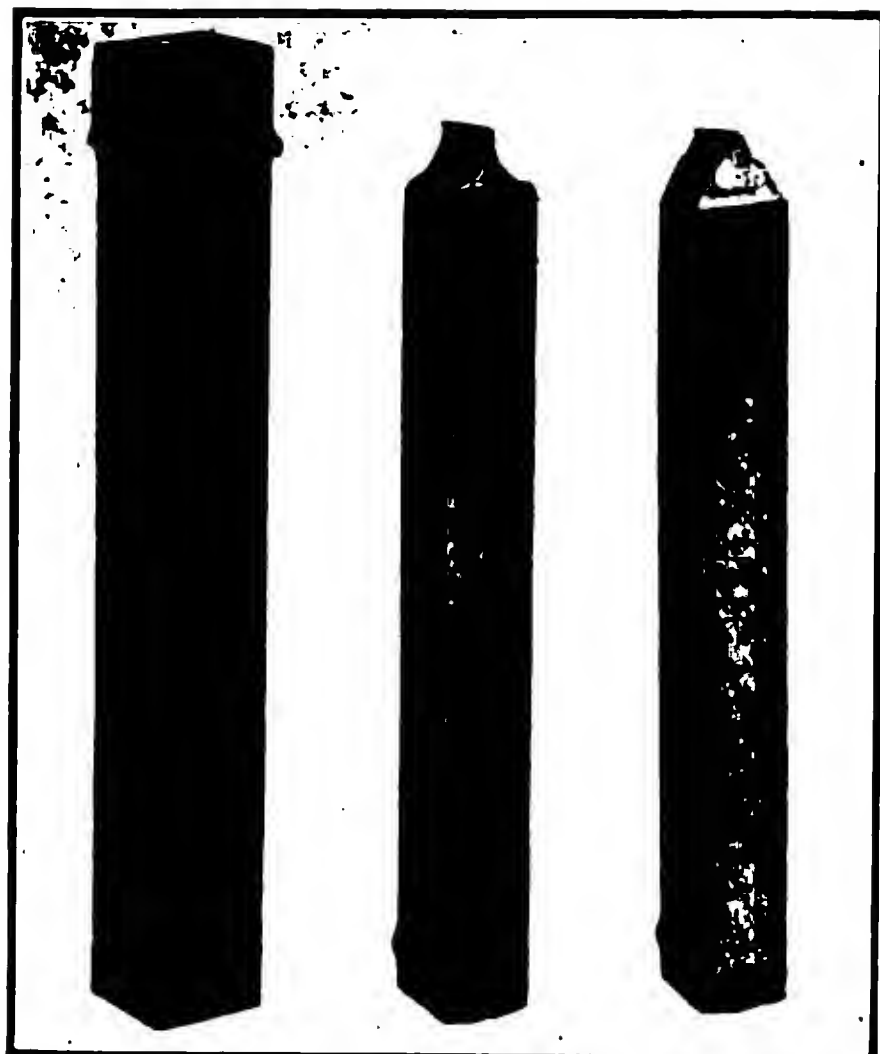


Fig. 5.

other face cam on the large driving gear. The releasing movement is accomplished positively, but the clamping movement is effected by means of a spring in order to eliminate the possibility of breaking some part if the clamping mechanism were accidentally adjusted too tightly.

The Indexing Mechanism.

The indexing mechanism, as shown in Figs. 7 and 8, consists of a split bushing guide, one-half of which is fastened to the ram spindle, the other half being attached to a revolving drum on which is mounted a worm gear driven by a worm and an intermittent gear train. The intermittent indexing movement is derived from a Geneva wheel and is transmitted through a set of change gears to the worm and worm wheel. By varying the ratio of the change gears in the train, indexing movements for any desired number of teeth may be obtained. Minute angular adjustments of the spindle position varying by one second of arc, for locating key ways, teeth of clusters gears, etc., are obtained by means of a differential

return. The driving motor is mounted on a sliding base and drives through a single set of speed change back gears. The drive for the indexing mechanism is taken direct from these gears. The pump for circulating the cutting oil is driven from a small sprocket on the end of the motor shaft opposite the driving pinion. The motor is controlled by a push button switch, automatic compensator and solenoid electric brake as seen in Figs. 1, 7 and 9.

The work arbor used in this machine, as shown in Fig. 11, is provided with a taper shank and thrust collar and fits the tapered socket in the ram spindle. The thrust collar prevents the taper shank being thrust too tightly into the socket. The gear blanks are put on the arbor and fastened in place by a nut while the arbor is held in a vise-like fixture attached to a bench at the side of the machine. After loading the arbor it is then dropped into the taper socket in the ram spindle and the machine is ready to work. The thrust of the cut forces the taper back into the socket until it strikes the shoulder of the arbor. The tight fit of the taper is sufficient to prevent the arbor from turning under the pressure of the cut, but is not sufficient to make it difficult to remove. While one arbor of gears is being cut another arbor is being loaded with blanks. As soon as the arbor in the machine is finished the operator holding the arbor of uncut blanks in one hand, stops the machine, presses a conveniently located foot pedal which, by means of a long kick-out bar passing through a hole in the center of the ram spindle, knocks out the arbor of the completed gears, and catches it in the other hand. He then drops the arbor of uncut blanks into the open socket, touches the starter button and the cutting operation again proceeds almost without interruption. The entire operation of stopping the machine, of changing the arbors and starting again, occupies less than one-half minute.

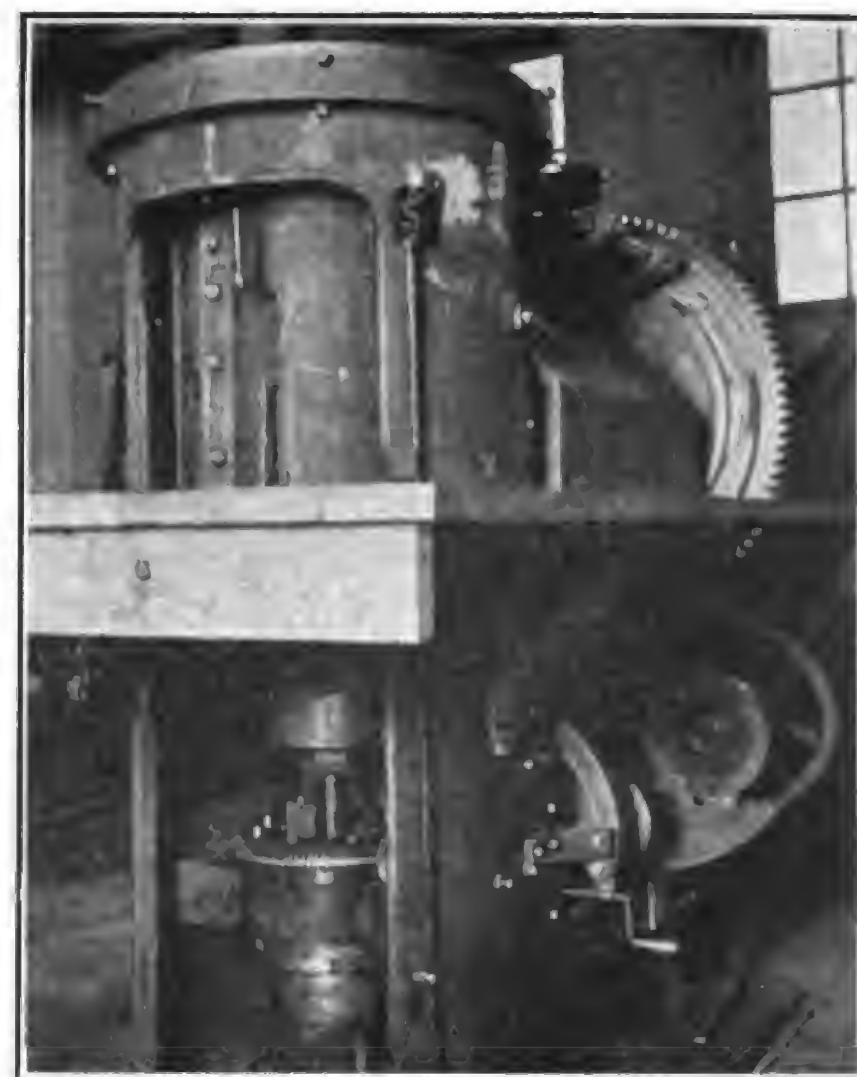
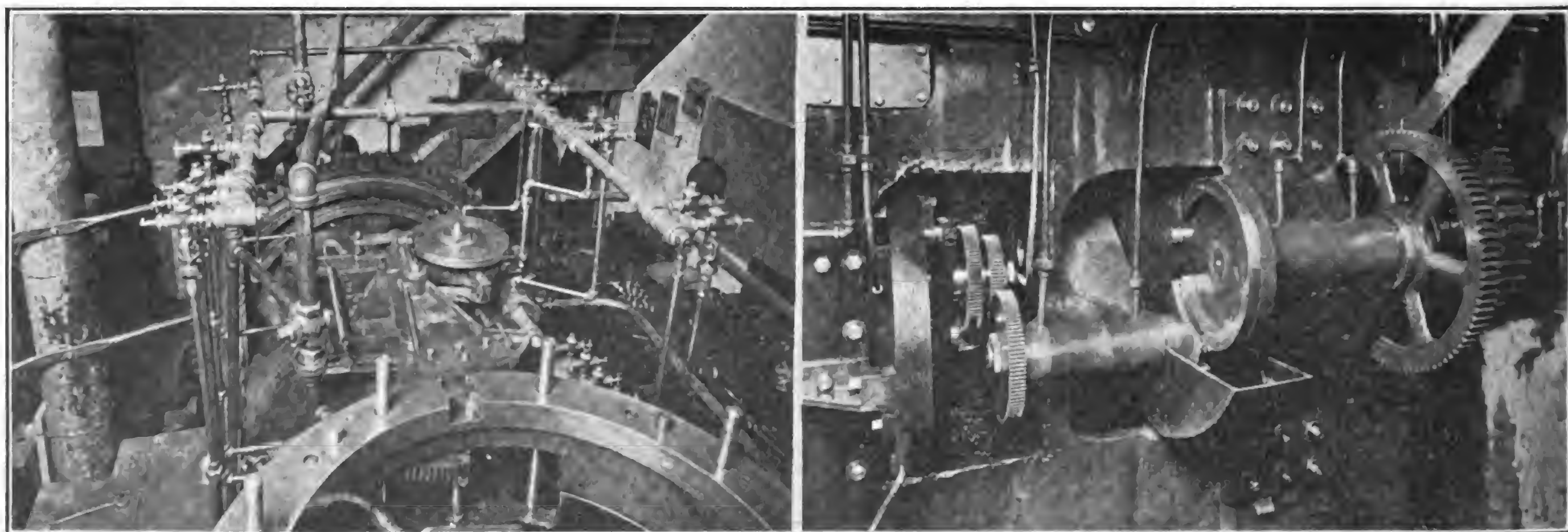


Fig. 7.

the total time of completing an arbor of gears ranges from one to three minutes.

Tooling Up Offers Opportunity to Display Ingenuity.

The tooling up of a job on the multiple shaper offers unlimited opportunities for the exercise of ingenuity on the part of the set-up man or tool designer, both as to variety of the tool bits and their arrangement. In cutting some gears, it is desirable to use as many tools as there are teeth in the gear. In others it is more practical to use only half or a third as many tools as there are teeth. In an arrangement of this sort, a tool head equipped with any number of tools could cut gears having any number of teeth which is a multiple of the number of tools used. Thus a spacing plate having 10 tools could be made to cut 10, 20 or 30 teeth, etc. In a case like this, if it is desired to cut a number of teeth greater than the number of individual tool bits which can conveniently be placed within the space, a gang tool bit is used



Figures 6 and 8.

clutch between the worm and worm shaft.

The main crank shaft is connected to the large back gear by a quick return crank of the drag link type, as seen in Figs. 1 and 9, which imparts a slow motion to the ram during the cutting stroke and a quickly accelerated motion for the

If it were necessary to remove the nut and change the gears on the arbor in the way that is usually done on other gear-cutting machines, the machine remaining idle in the meantime, it will be realized that it would make a very material difference in the amount of production from the machine, when it is remembered that

in which each tool cuts two or more teeth. This arrangement is particularly advantageous in cutting gears having a large number of very fine teeth, on account of the fact that, although the amount of power required for the cutting of all of the teeth is very small, it would, nevertheless, be practically impossible to

use as many individual tools as there are teeth in the product. Where it is desired to cut a gear having an odd number of teeth and it is not practical to use a tool for every tooth, as in the case of a 29-toothed gear for example, 10 tools might be used. Nine of the spaces between tools would be equal to $\frac{3}{29}$ of a circle each and the 10th space equal to $\frac{2}{29}$. While the service on one tool would be slightly less than that on each of the other nine, the difference would be scarcely appreciable. In some cases it is desirable to make every other tool in the form of some sort of a roughing tool, either a square nose gashing tool or a stepped roughing tool of the usual type and so adjust them that they will remove most of the stock from the tooth space. The alternate tools are then made in the usual type of finishing tools and take the last few finishing cuts. At other times a special cam is provided for one tool, so that this tool is held back during the stock removing cuts and is then suddenly fed forward ahead of the other tools to take the finishing cuts on all of the teeth. These various arrangements are merely suggestive of a few of the possibilities in this line. An unlimited number of possible combinations will readily suggest themselves to tool designers and set-up men acquainted with this line of work.

Multiple Shaper Adapted to All Cylindrical Products.

Although the Multiple Shaper is usually classed as a gear-cutting machine, it is adapted to the production of all cylindrical products having teeth or grooves such as sprockets, splined shafts, reamers, taps, milling cutters, saws, ratchets and knitting machine rolls. The advantage of cutting the teeth on the various products with the Stevenson Multiple Shaper, compared with standard one-tooth machines, varies as the number of the teeth or grooves in the product or the number of tools used. The reason for this is that the standard machines ordinarily cut one tooth at a time and the Stevenson Multiple Shaper ordinarily cuts all the teeth at once and consequently the products having the larger numbers of teeth have a greater capacity for increase than those with small numbers of teeth. For instance, in cutting splined shafts having six splines, the advantage is practically one to six. In fluting reamers having eight or nine flutes, the advantage is slightly more. In gears of ordinary size having around 20 or 30 teeth, the advantage is still greater. In cutting a fine-tooth saw, having 50 to 200 teeth, even if it were only possible to cut half or one-third of the teeth, the advantage would still be much greater than on products whose total number of teeth is comparatively small. This machine, using formed tools as it does, is able to cut an endless variety of toothed forms. In fact it will cut any toothed form which can be cut by any formed cutter, and in every case the speed will be in proportion to the number of tools in use.

A machine of the Multiple Shaper type possesses many advantages over a one-tooth machine in addition to the advantage of increased speed. The tools, being arranged completely around the circumference of the gear blank and all cutting

simultaneously, have a tendency to hold the gear blank central during the cutting operation, whereas one tool working alone has a marked tendency to spring the arbor and cause the gear to be eccentric. This condition is very noticeable where a long, slender arbor is used. On the one-tooth, gear-cutting machines a long arbor carrying five or six gears will frequently spring so much that the gears near the outer end of the arbor will be cut over size, or else those at the inner end will be under size, it being found impossible, in many cases where close limits of accuracy are required, to cut more than one gear at a time on account of the tendency of the blank to spring away from the cutting tool. The Multiple Shaper presents a very marked contrast to this condition. It has been found possible to stack more gears on an unpiloted arbor and still remain within the limits of concentricity than can be done on any other machine. An interesting example illustrating this point was found in fluting one-inch taper shank machine reamers. The holder, which was first made for this purpose, was provided with a tapered socket for holding the tapered shank of the reamer and also a collar for supporting the neck of the reamer up near to the flutes. As soon as the job was put into operation, it was found that the cutting pressure was so evenly balanced, the neck support was entirely unnecessary and therefore it was not used. The reamer was held by the taper shank only, with an overhang of five inches, and was cut



Fig. 11.

various materials, such as steel, brass or raw hide.

Another advantage, which appears in heavy work where a number of rough stocking cutters of different shapes are used before the final finishing cutter, is that, in this machine, the various roughing tools used can all be set in the same head in a convenient arrangement and fed in successively and in proper sequence, so as to take the various roughing and finishing cuts as a continuous and uninterrupted process without thought or attention on part of operator.

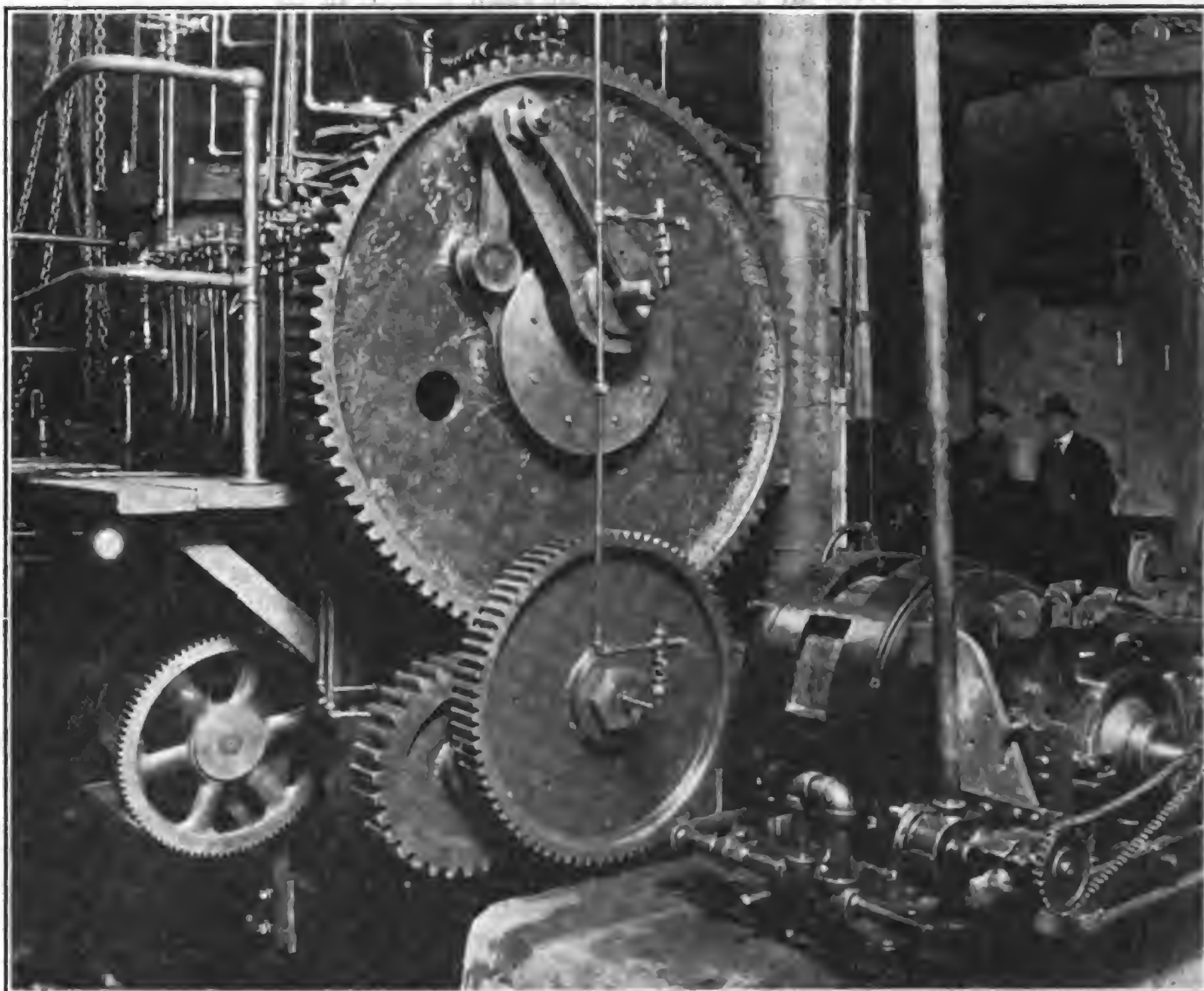


Fig. 9.

in a completely satisfactory manner without chatter or distortion.

Cutting of Laminated Gears.

Another example of this advantage was found in cutting gears of different materials stacked on the same arbor. This is particularly useful in cutting laminated gears, which are composed of sheets of

These machines will be built in various sizes and models according to the size and nature of the product, from the smallest watch pinion to large circular saws. Where the number of pieces of one kind is great enough to justify, special machines or standard machines with special attachments will be built.

Care and Operation of Engine

EXPERT SHOWS VALUE OF DAILY INSPECTION—TELLS HOW TO ADD TO EFFICIENCY AND LIFE OF TRUCK AND TRACTOR—EMPHASIZES NEED OF CLEANLINESS

THE truck or tractor operator will find it to his advantage to become familiar with his engine. But to become thoroughly acquainted with an engine it is not necessary to be constantly "tinkering" with it. More troubles may be traced to this habit on the part of some operators than to any other one thing, excepting carelessness.

If the engine acts irregularly, do not



Time Is Saved on Road by Carefully Inspecting Engine Before Starting.

have it immediately torn down and rebuilt, particularly if it is new. First, be sure that you know what the trouble is. If you are not certain, ask some experienced engine operator or write to the manufacturer.

Many of the difficulties encountered by operators may be avoided by giving the engine a careful inspection before starting out each morning. The few minutes thus spent may save valuable time and expensive repair bills.

Cleanliness Essential.

Keep the engine clean inside and out at all times. Dirt, permitted to accumulate, will be drawn into the carburetor and prevent its functioning properly. It may even pass into the engine in the form of dust and cause rapid wear on the valves and pistons and, working through the oiling system, result in injury to the bearings.

In particularly dusty localities, and especially in the case of tractors being operated in the fields, the carburetor air intake should be equipped with an air cleaner to prevent the entrance of dust. There are several very efficient devices of this sort on the market and, as they are easily fitted, every owner should see that one is installed on his tractor. Of late air cleaners have been recommended for truck use, as these vehicles encounter all kinds of roads, and often, in following other vehicles, great clouds of dust are encountered, more or less of the dust reaching the interior parts of the engine through the carburetor.

Keeping the inside of the engine clean is a matter of careful attention to the use of the proper lubricants and the supplying of a good grade of fuel. The oil reser-

voir should be frequently drained so that all foreign matter is removed from the system. In addition to draining, the crank case and reservoir should be thoroughly cleaned with kerosene before refilling with fresh oil.

The oil screen which surrounds the pump well should also be thoroughly cleaned at the same time. It may help keep this screen clean if the oil is strained through the cheese cloth before being put into the engine.

Truck engines can be operated from 500 to 1000 miles before cleaning the crank case and oil chamber, depending upon the dustiness of the locality. Tractor engines should be cleaned at least twice a week. Some tractor operators make it a practise to clean their engines twice a day, in the morning and again at noon. Tractor engines should always have the carburetor equipped with an efficient air washer and have all openings protected to prevent dust entering the cylinder.

The careful engine operator never uses too much oil in his engine for it will form carbon deposits in the engine combustion chamber, on the heads of the pistons and valves, foul the spark plugs and cause pre-ignition. The oil gauge should be inspected each morning to see that the engine reservoir contains sufficient oil.

Use Best Fuel Obtainable.

The grade of fuel used has considerable bearing on keeping the cylinders and combustion chambers free from carbon deposits. The best is always the cheapest. Fuel should always be strained before using as even a minute particle of dirt will cause a world of trouble in so delicate an instrument as the carburetor. If this dirt enters the cylinders it will form carbon or cause serious wear on cylinders and pistons.

The cylinders can be kept reasonably free of carbon by removing the spark plugs and introducing a tablespoonful of kerosene or denatured alcohol in each cylinder through the compression relief cocks about once a week.

The kerosene should be inserted when the engine is hot, and the engine turned by hand or by the starter. The best results will be obtained by placing this in the cylinder at night in order that it may have an opportunity to soften the carbon deposit before the engine is used in the morning.

Kerosene in Air Valve.

After the engine has been run for some time without cleaning the cylinders, gradually pour about a pint of kerosene through the air valve of the carburetor, with the engine hot and running at high speed, operating at this speed until the engine stops smoking. Water will also do the same. Do not choke the engine with the kerosene, but feed it in as fast as the engine will take it and run.

After this operation, place a tablespoonful of kerosene through the spark plug opening in each cylinder and do not use the engine for 10 or 12 hours.

After an excessive amount of carbon has accumulated in the combustion chamber, kerosene will not remove it. An effective way of removing carbon deposits too large for removal with kerosene is to either scrape it out by removing the pistons from the cylinders or have it burned out by means of an oxy-acetylene carbon remover outfit, which is part of the equipment of every up-to-date garage or service station.

Breaking in an Engine.

Breaking in an engine is a good deal like breaking a colt, except that learning the tractor and knowing how and when to take advantage of it is considerably more important than the training of a horse. This is true if for no other reason than that a greater value is represented in the tractor.

During the winter months when farm work is slack, the farmer usually turns to getting his young horses in shape for work. He is very careful to pick out a steady old horse to mate him with, picking a horse with good sense and good judgment, a horse that is not excitable, but one which on account of his staid



Teaspoonful of Kerosene Once a Week in Each Cylinder Prevents Formation of Carbon and Cleans Cylinders.

old ways and his well known worth, is sure to give a good performance of himself in company with this bucking, biting, kicking, squealing, balking, lunging, plunging, rearing, tearing parcel of well muscled, but undisciplined horseflesh.

Generally the farmer breaks his own colts, or turns the horse over to a man

of good sound judgment, who will see to it that the colt is not abused, who will see that the collar is not too tight, that the breeching does not rub, that the crupper is not too tight and that the tugs do not chafe. All of this precaution is taken with a colt worth from \$100 to \$150.

Too often it is true, that when this same farmer purchases a farm tractor costing anywhere from \$500 to \$3000, he hires cheap help to take charge of it, or worse yet, turns this investment over

to a hired man who has never had any experience in mechanics, and tells him to "run'er for all she is worth."

Breaking in an engine is a much more important matter than breaking a colt. In breaking in an engine, first be convinced that you know the limitations of that engine; determine for yourself what work the engine should do and what work it should not be called upon to perform. Treat it with the same

care that you would if the same amount of money was invested elsewhere. Use your good judgment, be reasonable and do not expect even a tractor to do that which is impossible. Do not call upon it to do more than the manufacturer has recommended it to do. Do not overload it; do not abuse it. See that it is properly lubricated at all times. See that the bolts and nuts are kept tight and in



Keeping the Engine Clean Not Only Conserves Appearance, but Power Plant Appears to Work Better.

place. Do not permit a rattle to continue. By carefully watching your engine you will soon learn to know by the sound it makes whether it is running in perfect time. Many an engineer can locate trouble merely by listening to the hum of the motor.

Study your engines as you study your colt. Try as hard to keep your engine in first class shape as you try to have the colt comfortable when hitched up.

It will pay in the end.



Always Strain Gasoline or Other Fuel Through Chamols with Funnel Resting on Top of Tank to Prevent Static Electricity from Causing Fire.

ACQUIRES SANDUSKY TRACTOR.

Cameron Motors Corporation of New York has acquired the large modern plant of the Dauch Manufacturing Co., Sandusky, O., maker of the Sandusky tractor.

Under the trade name "Sandusky Model A," the Cameron Motors Corporation is bringing out a new, small, general purpose tractor. It will be equipped with a four-cylinder Cameron air-cooled motor. Its design and construction are stated to be extremely simple and practical.

The new Sandusky has been constructed with a very definite purpose. Cameron engineers realized that the small, single-cylinder tractor or cultivator did not have sufficient power to meet more than a few farm requirements. They decided that a small tractor or cultivator, combined with big reserve power, would fill the widest range of usefulness.

The new Sandusky has all the advantages of smallness in its ability to get almost anywhere. In addition, its four-cylinder motor gives perfect balance and plenty of reserve power. The new Sandusky definitely fills the need for a small, general purpose tractor. The price will be \$425.

The new Sandusky has many refinements and its maker says that its fuel consumption is 20 per cent. less than other tractors of similar capacity because of its air-cooled motor.

The Sandusky Model A is equipped either as a riding or a walking tractor.

Production will be speeded up at the Sandusky plant to keep abreast of sales. The factory contains 100,000 square feet of floor space. Decision to manufacture the tractor only for the present, later adding the production of the Cameron car and light truck, was said by Cameron officials to be due to the definite demand

for an air-cooled tractor of this size and price at this time.

The dealer organization built up by the Dauch Manufacturing Co. comprises 300 members. The Cameron Motors Corporation is increasing its dealer organization and will cover a greater territory by the addition of 700 new dealers.

The corporation has also acquired the entire plant, equipment and business of the Greenville Implement Company of Greenville, Mich. This plant will be used by the Cameron Motors Corporation for the manufacture of standard and special implements used in connection with their tractor. This acquisition is in line with the aggressive policy of the Cameron Motors Corporation and will enable them to offer real power farming equipment to the practical farmer.

DEALERS' LEADERS TO SPEAK AT MANUFACTURERS' CONVENTION.

Invitations have been extended to Louis F. Wolf, president of the National Federation of Implement & Vehicle Dealers' association, and E. P. Bacon, president of the Eastern Federation of Farm Machinery Dealers, to address the 28th annual convention of the National Implement & Vehicle association at Chicago next October. Assurances have been given that these prominent representatives of the dealers will accept the invitation.

E. J. Baker of the Farm Implement News will represent the trade press; Dr. E. A. White, president of the American Society of Agricultural Engineers, will address the manufacturers on "Standardization," and as announced previously, the Hon. Henry C. Wallace has consented to present the views of the Department of Agriculture.

These features will undoubtedly be of interest to members of the association.

MUST MARK NAME OF COUNTRY ON GOODS SHIPPED TO CANADA.

Effective Oct. 1 all shipments into Canada must be marked with the name of the country in which the shipment originates.

In the case of large articles, this amendment to the Customs Act of 1907 will not work any great hardship, but where small pieces, such as repair parts, are concerned, the law may be exceedingly difficult to comply with, as well as adding a burden on to the manufacturer shipping the repairs, and increasing the expense of the part to the user.

Hope is entertained that some modification of the law will be made insofar as it applies to repair parts for machines. In its present form the act provides:

That all goods imported into Canada which are capable of being marked, stamped, branded or labelled in legible English or French words, in a conspicuous place that shall not be covered or obscured by any subsequent attachments or arrangements, so as to indicate the country of origin. Said marking, stamping, branding or labelling shall be as nearly indelible and permanent as the nature of the goods will permit.

If this provision is made to apply on small articles it will constitute a serious handicap to companies doing business in the Dominion.

An analysis of the pending tariff measure under consideration at Washington reveals a similar provision and representations have been made to Congress and the secretary of commerce with a view of securing such action as will eliminate this requirement from both the Canadian and American tariff laws insofar as the same applies to repair parts for machines when such machines are properly stamped or marked.



"Well, how'd the vacation go?" I asked O. M. Vett as we met in his office on a Monday morning.

"Rotten," he answered shortly. "Vacation was all right. Had a good swim or two, lots of sailing, caught a few fish, laid around a while and rested up some, but everything was spoiled for me by the awful price of things. Beach resorts—those I've seen—are presided over by a lot of pirates that have left the water and settled down on shore. These birds don't know the war is over," he finished disgustedly.

"Right you are," I said, thinking of a recent week-end I had spent. "I can testify to the fact that they get two prices for everything. But they claim that their business is so poor that they have to get the big money."

"That's just the point—the thing that makes me sore," grunted Vett. "They get the cart before the horse. They remind me of certain business acquaintances who are always telling about having to keep their prices up because it

costs so much to sell the goods.

"They send out their travelling men the same as ever; spend a lot of money in advertising and don't do any business. Then they yell about the high cost of making sales, and give that as an excuse for not lowering their prices when the factor that actually breaks them is the high cost of not making sales.

"They're just like the proprietors of the summer hotels of which I spoke. No business; therefore, keep prices up and get what profit is possible—when if they only got the prices down where they belong they'd have all the business they could swing to. They tell about hard times coming when they mean soft times going.

"The reason the automotive industry has come back so quickly from the post-war depression is because the manufacturers have slashed their prices regardless, and a lot of other industrial heads have got to learn that lesson before they can get started again.

"But as for the proprietor of the summer hotel where I spent my vacation, he hasn't been long enough away from the Spanish Main to understand different," he finished, gazing moodily at a persistent fly that was trying to crawl up the side of the plate glass window.

"Well, anyway, you had a good time," I said, endeavoring to cheer him up. "It'll do you a lot of good, too. Plenty of nice, clean water, lots of fresh ocean breezes."

"What kind of task is that?" interrupted Vett savagely. "Anybody would think I was a sail boat to listen to you," he grunted.

EDUCATIONAL WORK REDUCES NATION'S TIRE BILL.

With the number of automobiles, trucks and motorcycles advanced to the point where there is now one motor vehicle to about every six adults in the country, attention continues to be focussed on the nation's bill for tire abuse and the avenues through which savings can be effected.

Whereas 10 years ago, according to data compiled by the Firestone Tire & Rubber Co., few tire buyers gave much attention to the need of tire care, today with tire prices at the lowest level in history and with quality never so good, the truck owner and motorist are giving their tire equipment as much attention and considering their tires as of the same relative importance as the vehicle's mechanism or body. This accounts in no small measure for the splendid average mileages now rolled up by good tires, for now they are allowed to demonstrate all the worth built into them.

The motorist is realizing, with the operator of the pneumatic shod truck, that to allow his tires to run on week after week without checking up to see if the air inflation is at normal, is to run the chances of excessive stretching and heating for, when soft, the casing runs against a wave in the tread rubber which, under these conditions, will pull away and separate from the tire's carcass. Another little inflation angle is to replace their air at least twice a year. Stale air has a deteriorating effect on the tube, say Firestone service experts.

All statistics gathered by this tire manufacturer tend to show a noticeable decrease in tire abuse. Troubles contended with in the past due to driving in car tracks, curb bumps, wheels out of alignment, neglected cuts, severe application of brakes, misapplication, etc., have been abated to no little extent, thus adding to tire mileage and the enjoyment of motoring, not to mention the decrease in operating costs of both passenger cars and commercial vehicles. Credit for this, says the Firestone Co., may be given to the established tire dealers who, working in cooperation with the manufacturer, have been for years educating the nation's tire buyers in the money-saving advantages of taking care of their tires and showing them how to do so, offering their own services besides.

NEW TARVIA ROAD MAINTENANCE BOOKLET.

The Erickson Co., advertising agent, 381 Fourth avenue, New York City, is distributing an attractive booklet entitled "Road Maintenance with Tarvia," the purpose of which is to show the various methods of maintaining pavements of every description. It outlines and illustrates the steps to be taken in patching every type of roadway. These methods are clearly described and accurately illustrated so that, by simply following instructions any variety of pavement can be easily maintained.

The booklet is published and copyrighted by the Barrett Co., maker of Tarvia.



SOME PERFORMANCE

Ten years ago it took 28 mules three days to transport one of these immense boilers 5000 feet up in the Sierras to the Madera Sugar Pine Mills, 60 miles from Madera, Cal., the nearest railroad point. Recently a five-ton Federal performed the same task in one day despite the prophecies that it would never negotiate the steep mountain grades.

When Harvey Shuman, the operator of the truck system which keeps this isolated camp supplied with the necessities of life and machinery for its work, de-

clared he could get this huge boiler up to the camp with his Federal, he was laughed at.

The roads are full of dangerous winding turns, often attaining a grade of 20 per cent., and several times it was necessary to chop down a fair-sized tree and drag it as an additional brake.

In another place, the flume, or wooden trough, in which the logs are floated 60 miles down the mountain side to Madera, had to be cut to allow the truck to pass under with its huge load.

Good Roads Movement Gets Results

NEARLY 2000 AGENCIES NOW ACTIVELY ENGAGED IN PROMOTING CAUSE OF BETTER HIGHWAYS—MORE THAN 250,000 MILES OF SURFACED THOROUGHFARES CONSTRUCTED IN UNITED STATES AND CANADA, SAYS HIGHWAYS INFORMATION SERVICE.

(By C. S. LEE, Director Highways Information Bureau.)

THE growth of the Good Roads Movement in the United States and Canada since its organized inception in 1880, and with the great stimulus it received in the periods immediately following the advent of the automobile and the appearance of the motor truck, has been so rapid, so extensive and so effective that highway construction today constitutes one of the greatest, if not the greatest problems in American economic life.

There are now 1702 organized agencies actively and directly pleading the cause of good roads. The agitation, to date, has brought about the construction of 310,000 miles of surfaced highways, raising the highway mileage of the United States to 2,478,552, and that of Canada to 255,000.



A Perfect Highway in Tennessee.

The automotive industry, the fourth largest in the country, with 368 manufacturing plants capitalized at \$1,204,378,642 and employing 325,000 workmen, having an annual output of 2,205,197 passenger cars and trucks, valued at \$3,594,814,620, and supplemented, as it is, by 1900 firms producing automobile parts, valued at \$300,000,000 a year, together with 1000 firms manufacturing annually 35,000,000 tires valued at \$1,000,000,000, is absolutely dependent upon highway improvement for its stability and upon increased road mileage for greater expansion. In addition, 33,000 distributors of automobiles are involved, as well as 45,800 dealers in automobile accessories and 35,000 dealers in tires. So great, too, has the road-building industry become, in consequence of the demand for improved roads, that there are now 7500 contracting firms engaged in actual construction work. The roads are now traversed by 9,211,295 licensed cars and trucks, of which 3,000,000 are used on the farms. These cars consumed 3,200,000,000 gallons of gasoline last year.

Prior to 1880, when Amos G. Batchelder, late chairman of the executive board, American Automobile association at Washington, with H. S. Earle of Detroit and other pioneer advocates, organized the League of American Wheelmen and began a systematic campaign, a good

roads enthusiast was looked upon with undisguised curiosity or amusement as something of "a nut"—a loquacious—but, no doubt, well-meaning person who might be seen but not heard. Usually he was promptly "sat down upon" by the lugubrious taxpayer.

Opposition to Good Roads Campaign Gradually Melted Away.

Opposition gradually melted away,

PRODUCTIVE EFFORT.

Of the agencies that are now fighting for highway improvement, 56 are organized movements for the construction of certain national or interstate highways, 15 are national or interstate good roads associations, 34 are state organizations, 304 are automobile associations and motor clubs, 260 are road contractors, material or machinery trade associations and engineering societies, 32 are motor truck and automobile trade organizations and 131 agencies are publications devoted to the movement in one form or another. In addition, there are 735 chambers of commerce, merchants' associations and boards of trade having good roads committees and 135 national trade or industrial associations having standing committees which frame the policies of those organizations in matters pertaining to highway improvement.



In the Heart of Cumberland.

however, as the campaign became more fully organized and extended. Since 1880 more than \$3,000,000,000 has been spent for highway improvement in the United States and Canada. More than \$1,300,000,000 is now available, and \$1,500,000,000 additional will be necessary to carry out the projects under contemplation. And yet, with all this, only a beginning has been made. Billions more must be expended before the country has anything like a highway system adequate to the traffic needs.

The great demand for good roads and the progress made in road building has evolved many types of hard-surfaced roadway, of which the bituminous are in greatest general use. The popularity of these types, especially those of the sheet asphalt, the asphaltic concrete and asphalt macadam, is due to their long-wearing qualities, resiliency against traffic impact, dustlessness, noiselessness, cleanliness and low cost of upkeep. Brick and concrete roads have also developed with the agitation as have the wooden block and granite block types. The most recent available figures give 42.11 per cent. of the surfaced roads in the United States as being of gravel, 25.22 per cent. as of macadam, 17.16 per cent. as of sand-clay, 10.98 per cent. as of asphalt and other bituminous materials, 3.91 per cent. of concrete and 0.62 per cent. of brick. The



Along Beautiful Lake Chautauqua There Is a Stretch of Perfect Road.

figures for the asphaltic and brick types, a total of 15.53 per cent., show the extent to which the city types of pavement have been adopted in the rural districts. The wood block and granite block types do not appear to have progressed as yet beyond the city boundaries.

The extent to which the dustless types of pavement are being adopted is further shown by testimony given recently before the Senate Committee on Postoffices and Post Roads at Washington by Thomas H. MacDonald, chief of the United States Bureau of Public Roads, whose tabulations showed that 107 federal aid projects completed and paid for to May 25, this year, were roads built of bituminous materials. These highways were constructed in Alabama, Arizona, Arkansas, California, Georgia, Idaho, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont and West Virginia. Additional federal aid highways of the same types have been approved and are under construction in Kansas, Maryland, Tennessee, Virginia, Connecticut, Wisconsin, New Mexico, Utah, Florida, Montana and

Wyoming. Illinois, New Jersey and Nevada have lately included bituminous roads in their future federal aid programmes.

22,030 Miles of Federal Aid Roads.

According to other figures compiled by the Federal Bureau there are now 22,030 miles of federal aid roads in the United States. These have cost \$361,946,868. The latest figures compiled by the Asphalt association, New York, show that \$343,678,712.36 were made available in 569 new highway bond issues by states,

counties, townships, road districts and municipalities in May and June this year. This makes \$1,343,678.36 now available for road work in the United States during the next two years.

It has been only by the most persistent efforts on the part of the advocates and the formation of militant organizations everywhere that the "Good Roads Movement" has been carried to its present high estate. The automobile and the motor truck have done more to form a favorable sentiment than any other agency.

Interest on the part of nearly 10,000,000 automobile and truck owners, as well as the owners of 6,000,000 teams of horses and mules regularly using or working on the highways, not to mention the smaller numbers of federal, state, county, district and municipal highway officials, engineers, contractors, manufacturers of machinery and materials, rural mail carriers, resort owners, farmers, merchants, real estate dealers, motorcyclists, bicyclists and others directly interested, has given to the movement strength so great that no politician, national, state or local, dare refuse to listen when there is an honest demand for road improvement. At least 30,000,000 Americans are now advocates of good roads.



Steep Grade Near Monticello, N. Y., on an Unimproved Highway.

TRACTOR AGAIN PROVES SUPERIOR TO HORSES.

A demonstration recently made by the Reliable Tractor & Engine Co. of Portsmouth, O., to prove to a buyer the superior value and amount of work performed by a Reliable tractor as compared to plows drawn by horses, proved to the buyer beyond the question of a doubt that the tractor would and could do all that was claimed by the manufacturer and perform the work at far less expense.

The field in which this demonstration took place had been in alfalfa for five years, and the ground was matted with alfalfa roots, some of them being as large as a man's thumb. All of the plows, both horse and tractor-drawn, were 14-inch mould boards, the tractor hauling two and of the horse-drawn outfits using one plow each attached to a sulky.

The horse outfits were not able to average an acre a day. The tractor averaged close to five acres. The horses were plowing an average of five inches deep and the tractor more than six. The tractor made five rounds of the field while the horses were making 3½ rounds. The

cost with the tractor was very much less and finished up the work much more quickly.

A very noticeable and significant fact was that the horses were tender and perspired very freely and finally were removed from the field entirely, as the work was considered too hard and it was punishment for them under the circumstances, as the alfalfa sod was very tough and hard to turn over.

The fuel consumption of the tractor in this sort of plowing was less than 2½ gallons of kerosene oil to the acre, and approximately one gallon of lubricating oil for a 10-hour run.

The man for whom this demonstration was held was skeptical as to the value of a tractor for this type of plowing and after the demonstration was over he was so enthused with the amount and value of the work done that he purchased a tractor as the result of the test.

AWARDED CERTIFICATE OF MERIT.

NEW YORK, Aug. 15.—To the National Automobile Chamber of Commerce has been awarded a certificate of merit by the War Department of the United States

in recognition of loyalty, energy and efficiency in the performance of its war work, which materially advanced the war programme.

The citation by the Director of Purchase, Storage and Traffic at Washington, says that the certificate is awarded "For the hearty and efficient cooperation in response to the need of the government for motor vehicles in the war with Germany. They immediately placed all their resources at the disposition of the army, waived individual commercial advantages and finally accepted cancellation of their orders cheerfully and at bare cost on the suspension of hostilities."

This visible recognition of patriotic war service will be highly appreciated by the automobile industry which contributed all it had to the war programme. It established headquarters at Washington, with representatives in charge who knew production, engineering and transportation that were helpful to the governmental programme. The industry made trucks, tractors, airplanes, engines, motor cars, field kitchens, shells, guns and many other articles for which it was well equipped.

New Types of Commercial Bodies

Moving Vans Designed for Long Distance Work Require Special Fittings and Equipment, Padded Sides, Sleeping Quarters and Seats—Ambulance Bodies Fitted and Equipped for Hospital Service

IT IS often necessary, when equipping for motor transportation, to purchase the truck chassis and have a special body built by a company who specializes in heavy duty bodies. Among these are the Hopkins Manufacturing Co., Han-

over, Pa. Another type of body in which this company specializes is the two-patient ambulance. The illustration shows the interior view of this body mounted on a White truck chassis. This outfit, which is said to be meeting with heavy sales

with a window sash and there is a corresponding sash in the opposite side, but without the door. This lighting arrangement provides sufficient light, together with that which passes over the back of the front seat, as two heavy panels of glass are positioned above the back of the seat, which can be dropped if necessary in warm weather. The folding seats at the side are for the surgeon and attendant. The interior is equipped with two dome lights, exhaust heater, speaking tube and medicine chest on the left side, and the floor is linoleum covered. There is a hood which extends over the driver's seat and the body is equipped with windshield and fore doors. The inside measurements are: Length, seven feet, six inches; width, four feet, four inches; height, five feet, six inches.

Other bodies built by the company recently include a heavy one of the covered van type for the American Sugar Refining Co., mounted on a five-ton Pierce-Arrow chassis. This body is constructed of unusually heavy material and is particularly well ironed, due to the fact that it is designed to transport a commodity the weight of which is excessive in comparison with its bulk.

Bodies which the Hopkins Manufacturing Co. is prepared to build include sight-seeing busses, funeral cars, hotel and passenger busses, furniture and general merchandise bodies, and moving or storage vans of large size. That they are proving popular is shown by the ever-increasing number of orders received.



Type of Moving Van Body Designed and Built by Hopkins Manufacturing Co., Hanover, Pa.

over, Pa., which manufactures strictly high-grade van and truck bodies for commercial vehicles. Two types manufactured by this company are shown in accompanying illustrations, which are stated to represent the last word in commercial body and van construction as exemplified by this company.

The H. A. Hartman & Son moving van has a loading space 16 feet long, six feet seven inches wide and six feet six inches high. The tail gate is 24 inches wide and is fitted above at the rear of the van with double-hinged doors. The rear corner posts are arranged with roping knobs and the tail gate is equipped with a special heavy iron bar and chain so that it may be loaded in an extended position. The panels are of $\frac{5}{8}$ -inch poplar. The hood over the driver's seat is arranged with sleeping accommodations for two men, while a sliding panel above the steering wheel furnishes access to the hood. As the cab is the full width of the body, a third man can sleep on the driver's seat. Small electric marker lights are placed on each corner post of the body at front underneath the hood, indicating the width of the body for passing vehicles. A dome light is furnished in the sleeping quarters and a dome light is fitted in the center of the body, expediting unloading at night. This body is mounted on a $3\frac{1}{2}$ -ton Armleder chassis equipped with pneumatic tires, which necessitates a wheel housing on each side of the body in the interior.

from city hospitals and police departments, embodies the latest ideas in ambulance service.

The outside panels are of aluminum and the inside is lined with metal, enamelled white. The rear step is arranged to drop automatically when the rear doors are opened. There is a hinged door on the right side of the body fitted

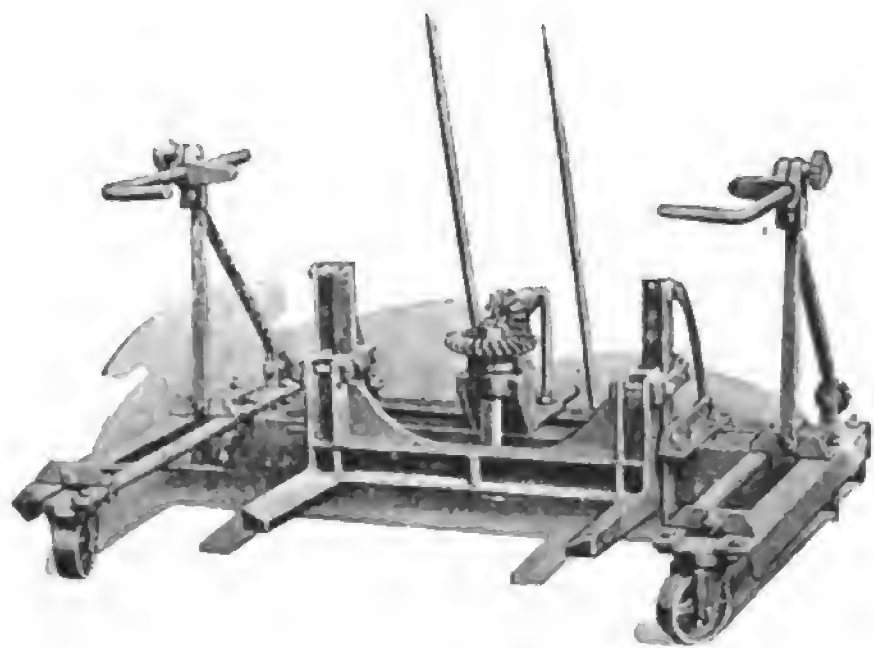


Interior Fittings of Hospital Ambulance Built by Hopkins Co.

Practical Tools and Equipment

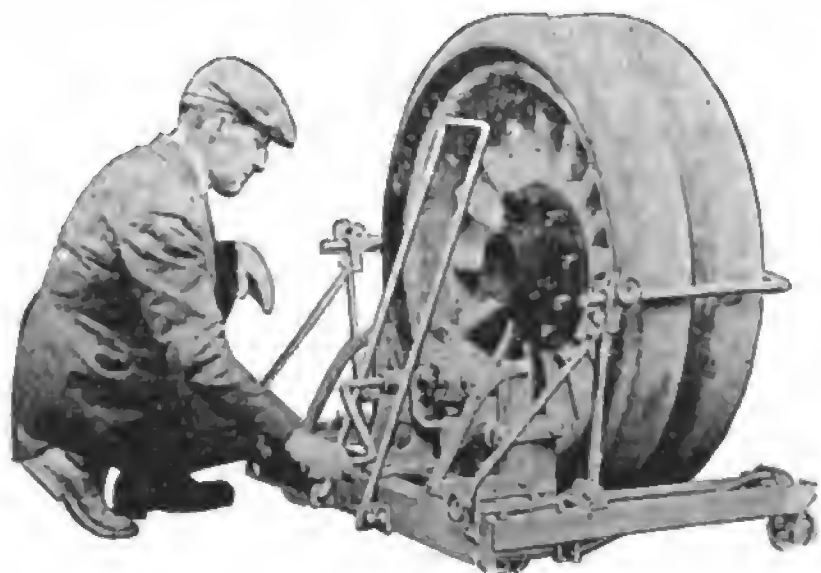
MANLEY TRUCK WHEEL DOLLY.

The Manley Manufacturing Co., York, Pa., announces that it is now in production on a new truck wheel dolly which greatly reduces the time and labor re-



quired to remove and replace the heavy single and dual-tired wheels of motor trucks. The dolly is made of sufficient strength to successfully handle the heaviest truck wheels, and is constructed in such a manner that one man is able to remove, lift and haul the heaviest truck wheel to the tire press for the removal of the tires.

The operation of the dolly is simple, as it is portable, rolling on four steel



caster rollers, one fitted at each corner. Two extension arms slip under the wheel and tires, and are raised by means of a crank and bevel gearing to clear the wheel from the floor. The wheel is then pulled on the dolly to the tire press.

STORM VERTICAL BORING MILL.

The Storm Manufacturing Co., Minneapolis, Minn., is showing a boring mill which has been developed for service station and fleet owners who wish to resize engine cylinder blocks and refit oversize pistons and rings. The machine is driven by the shop power and consists of a vertical stand of rugged construction fitted with a table top 25 by 30 inches, equipped with two parallel sliding rails on which cylinders or other work are easily mounted. An adjustable clamp, consisting of a cast-iron arch with clamp screw and hand wheel, clamp rods and feet, affords a positive means for securing the work.

The inner mechanism consists of a hollow boring bar supported in liberal bronze bushings and actuated by a heavy

feed screw. The drive is transmitted by cut gears and a variable boring bar speed is obtained through a counter shaft and three-step cone pulleys. The boring bar has a feed of nearly 24 inches, making it possible to cut to a depth of over 20 inches.

Four cutter heads of the Standard Storm multiple cutter adjustable type are furnished, affording a diametrical boring range of from 2 1/2 to 7 1/2 inches. Other extras may be furnished, adapting the tool to a wide variety of boring uses.

NORLAND SAFETY TRUCK JACK NO. 1.

The Norland Novelty Co., Williamsport, Pa., is placing on the market a newly developed truck jack which, for speed and efficiency, is designed to meet the needs of a large majority of truck users.

Unusual strength is incorporated in this new model and the lifting device is

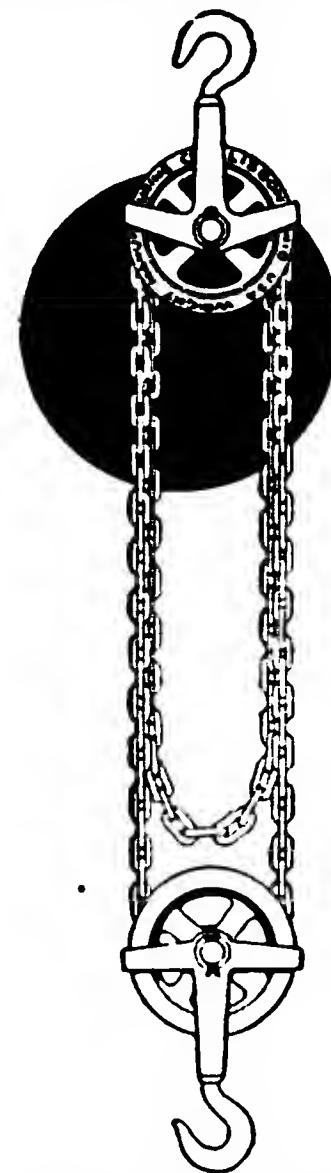


simple and positive in action. The turning motion of the handle is transmitted through a worm to the worm wheel to a driven shaft and by means of spur gear and rack to the jack. The power thus exerted by the handle is multiplied and statement is made that axles of the heaviest trucks are lifted with ease.

WRIGHT HIGH-SPEED HOIST.

The Wright Manufacturing Co., Lisbon, O., announces the production of a chain hoist for garage and service stations which is especially designed for this class of service.

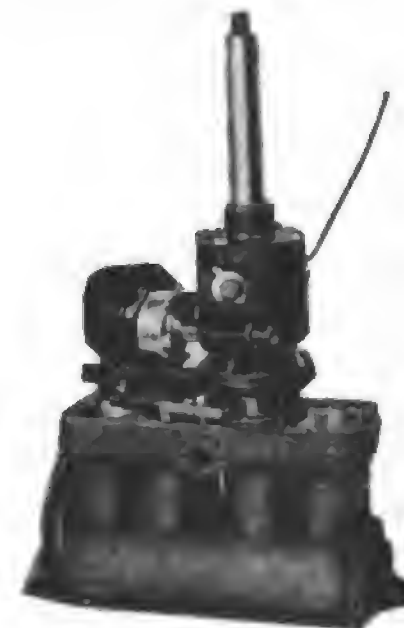
A feature brought out forcibly in the Wright hoist is that provision is made for lifting heavy objects, such as engines and car units, with the least amount of effort on the part of the worker. In lifting with



the one-ton speed hoist a pull of only 80 pounds is exerted as against 218 pounds with a differential type block. With the two-ton speed hoist a pull of 120 pounds is exerted as against 306 pounds with the pulley block.

VAN DRESSER REBORING TOOL.

The International Purchasing & Engineering Co., 506 McKerchey building, Detroit, Mich., announces a late development in cylinder reboring tools, namely,



the Van Dresser electric driven reboring tool. A point which is strongly featured is the fact that it is driven by an independent electric motor directly connected to the driving shaft. The tool is portable, of sturdy construction, and is claimed to be fool-proof. The range of work is from 2 3/4 to 5 1/16 inches.

New Motor Truck Accessories

ARO TYPE CENTRIFUGAL WATER PUMP.

The Arrow Pump Co., 54 Buhl building, Detroit, Mich., announces that it is now

part of the engineering department of the company.

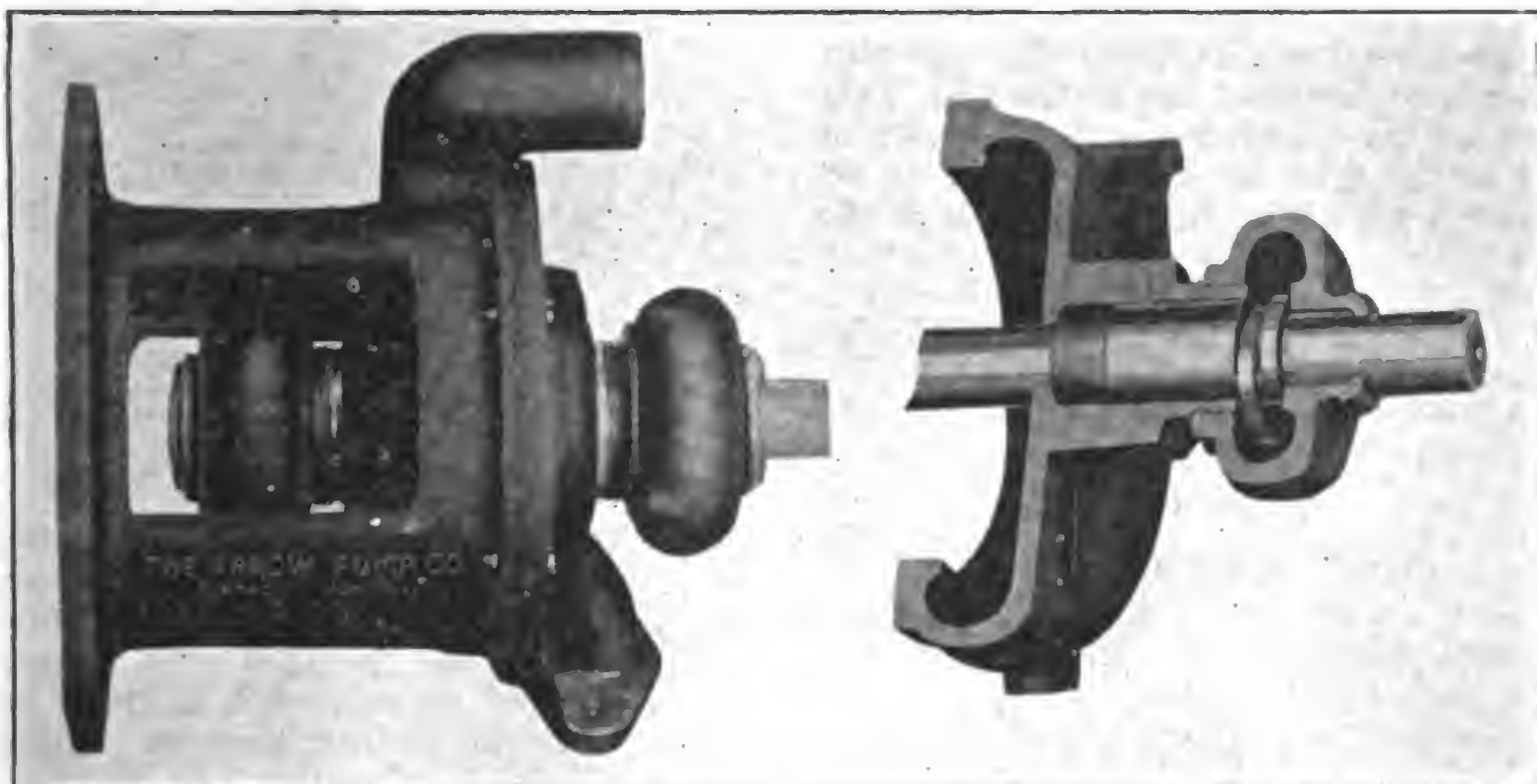
It is claimed that the construction of this pump eliminates troubles experienced with other types, such as leaky

which acts partially as a pneumatic load-carrying member, although air is not added to it from time to time as in the conventional pneumatic tire.

The Smith cushion wheel is made up of four units, namely, the wheel, cushion, steel locking rings and cushion retaining ring. When the four parts are assembled, they are all held in place automatically and the wheel is ready to receive the pressed-on tire in the usual manner.

SPENCER-SMITH PRECISION PISTONS.

The Spencer-Smith Machine Co., Howell, Mich., manufactures a line of precision piston rings for replacement purposes that are made from the finest grade of grained semi-steel, which is a more resilient and better wearing metal than



in production with a new type of pump which has been developed after a successful period of experimenting on the

glands, scored shafts and short life of bearings, shafts and packing, due to improper lubrication.

REX JACK.

The Zim Manufacturing Co., 208 North Wabash avenue, Chicago, Ill., is placing on the market a strong, sturdily-built jack, made entirely of heat-treated steel and malleable iron, which rolls into position under the axle on four strong rollers.

The Rex jack locks automatically at all heights in raising and lowering. Its de-



sign and construction make this a practically indestructible jack.

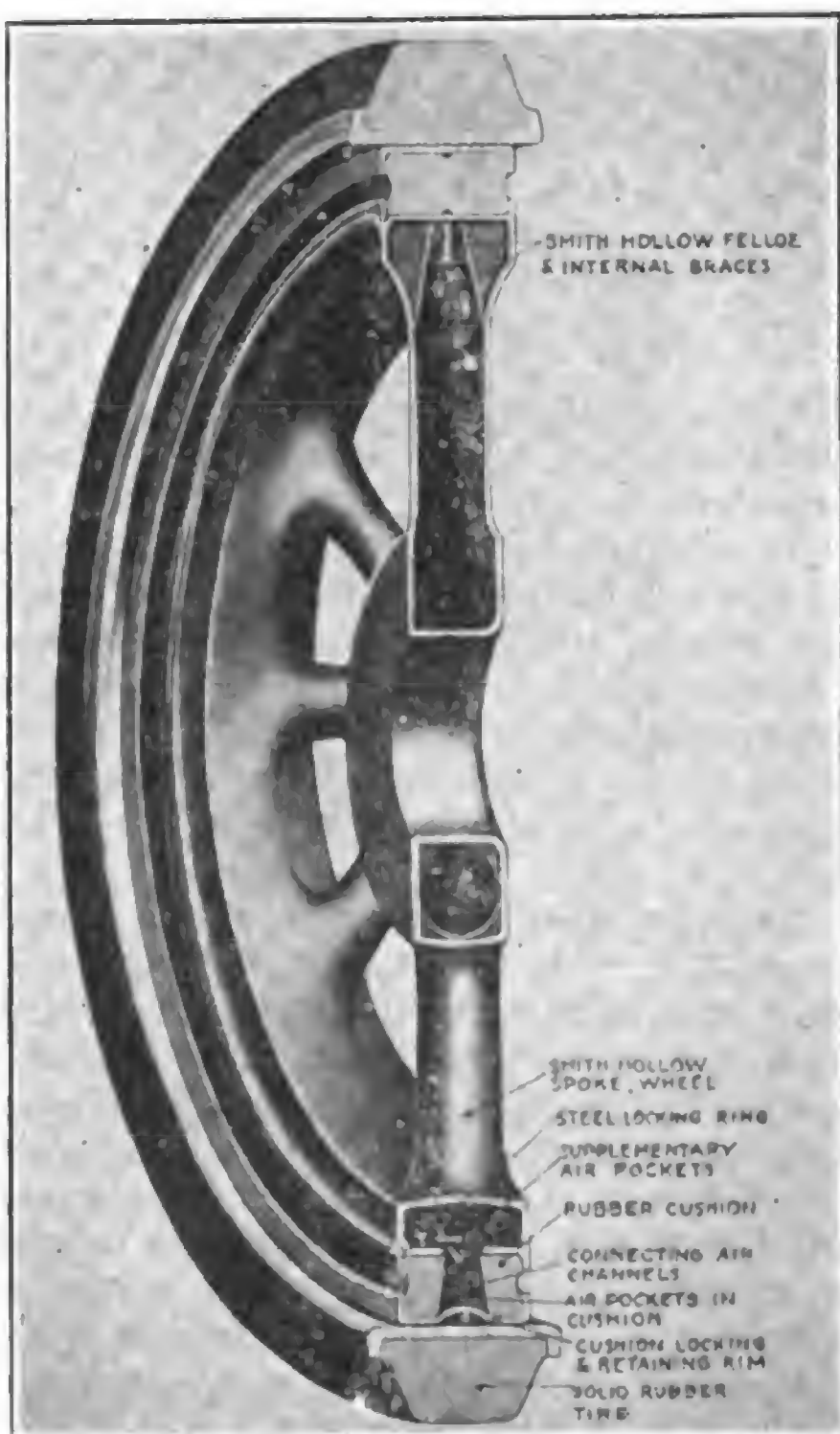
Collapsed the jack is 5½ inches in height, which is extremely low for a service jack and when extended the height is given as 20½ inches. The capacity is 1½ tons.

SMITH CUSHION MOTOR TRUCK WHEEL.

Smith steel wheels have been in use for a period of time on many makes of motor trucks, many owners preferring them to the conventional wooden type on account of their greater strength and freedom from loosening.

An improved type of Smith wheel em-

plays a cushioning device between the tire and felloe band, which eliminates road shocks and vibration of the road



from reaching the chassis mechanism. This device consists of air pockets confined by cushion locking and retaining rims. The weight of the loaded truck is, therefore, carried on the confined air



the ordinary gray-iron casting formerly used. This metal contains about 17 per cent. of steel, which gives it a greater tensile strength and stamina than gray iron.

The ring grooves are held to a machining tolerance of one-half thousandth of an inch plus or minus, as is also the outside diameter. The castings are thoroughly annealed before machining at 1350 de-

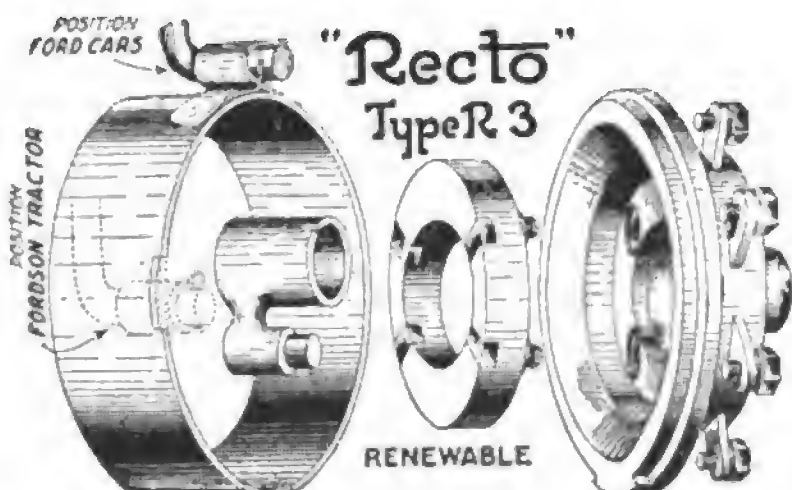


grees Fahrenheit, which produces the extreme warp in the metal and relieves it of all strain so that when the pistons are in use there is no tendency for them to distort or warp out of round due to the heat of the engine.

Pistons can be obtained for practically any make of engine, either passenger car or truck.

RENEWABLE TIMER FOR FORDS.

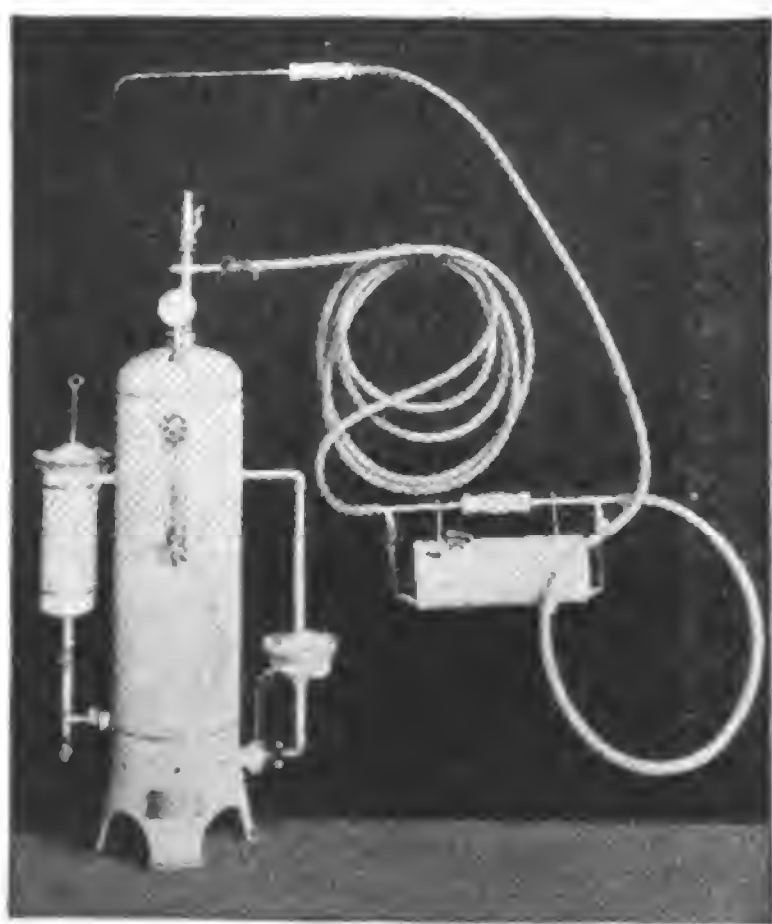
The Recto Manufacturing Co., Cincinnati, O., is manufacturing a timer for the Ford that is renewable. The outer case and the race may be purchased new at a cost of \$5. When the track becomes worn and replacement is necessary, the worn track is removed and the new track



inserted in its place. As the other parts of the timer do not wear in proportion, the life of the timer is practically indefinite. New tracks are easily purchased from the company or any of its dealers at a cost of \$1, while new brushes may be bought for 30 cents.

EUREKA AUTOMATIC STEAM GENERATOR.

The P. M. Lattner Manufacturing Co., Cedar Rapids, Ia., is showing the Eureka Automatic Steam Generator, No. A-1E, which is equipped as a parts cleaner, grease eradicator and paint remover combined in one unit. This device is recommended for small public garages or private owners operating truck fleets, as it will easily clean from eight to 10 trucks a day when used as a grease eradicator and parts cleaner and from two to five a day when used as a paint remover. The

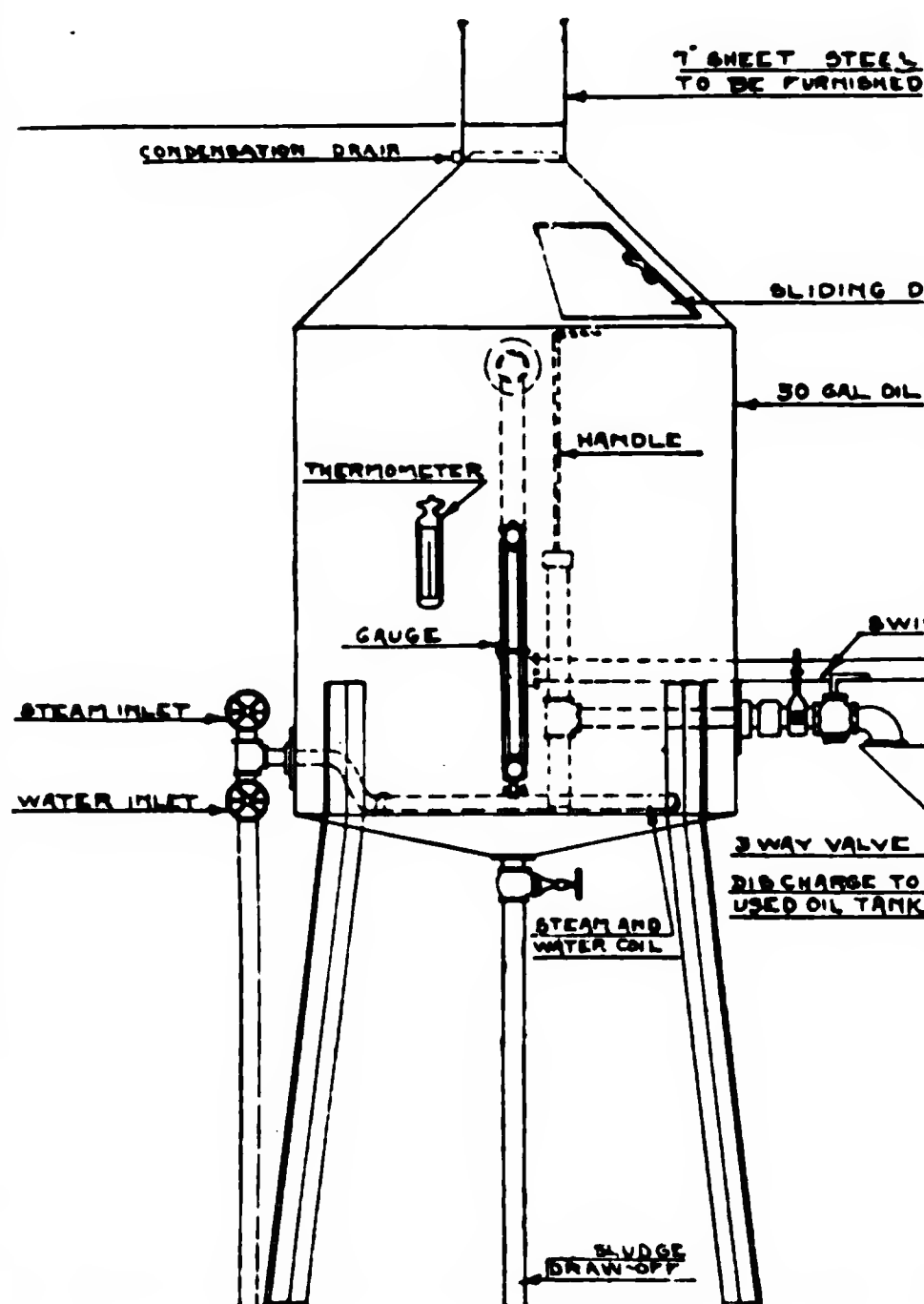


device consists of a generator or boiler equipped with automatic fuel and water control, an atomizer and solution tank, together with the necessary hose connections, filler plugs, valves, atomizing jet and tube.

The generator is of the flash or quick-steaming type, equipped to burn either artificial or natural gas or gasoline and will build up a working steam pressure in a very few minutes time. It has sufficient capacity to maintain a working pressure at the nozzle of 50 to 60 pounds for constant service.

OIL RECLAIMING OUTFIT.

S. F. Bowser & Co., Inc., Fort Wayne, Ind., announces that it is now in production with a newly designed device for reclaiming used motor oils in service stations and public garages. It has been realized that there is an ever increasing need for a reliable device which would reclaim oil drained from the lubricating systems of automobile, truck and tractor engines. With the increasing use of heavier engine fuels now being sold to the consumer, the oil in the crank cases of these engines becomes diluted with the heavy unburned end of the fuel. This dilution not only reduces the viscosity of the oil to such an extent that it is no longer a lubricant, but, by reason of the



dilution, there is a loss of power due to the increasing friction and loss of compression.

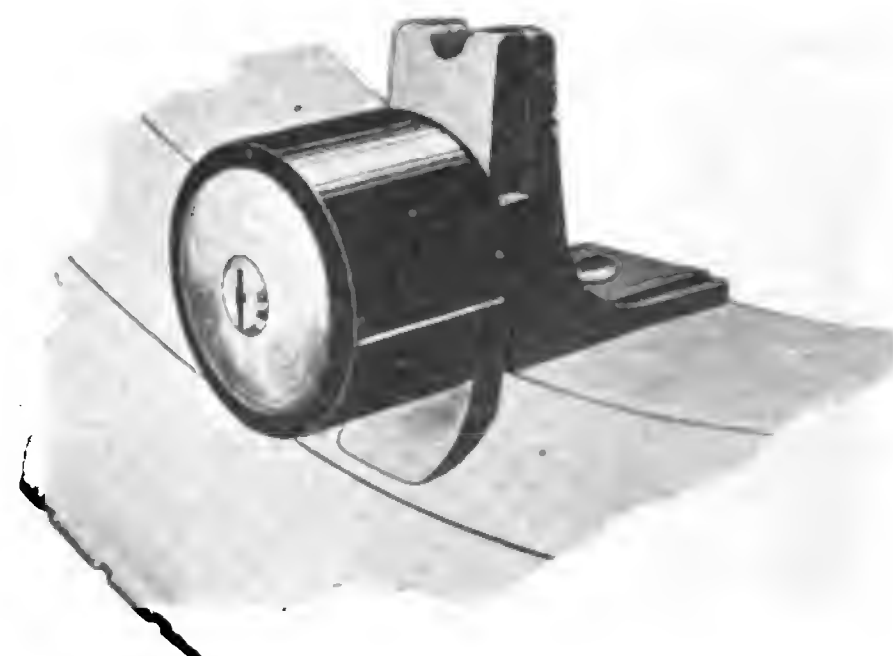
The purpose of the Oil Reclaiming outfit is to handle all used engine oil from the garage and, by means of the Bowser process, reclaim the good oil from the sediment, unburned fuel, etc., and to restore it to as near its original viscosity, fire and flash point as it is possible to attain.

Two separate operations are required to achieve this result. It is first necessary to eliminate the diluting ingredients, and, second, all harmful solid foreign matter in the oil must be removed. These two operations are stated to be performed very satisfactorily in the Bowser Oil Reclaimer. Regardless of the degree of dilution or how much foreign matter is present in the oil, the Reclaimer, it is stated, can be operated so as to eliminate both.

Steam pressure is used to drive out the gasoline present in the oil, the Reclaimer operating on the principle of a still, while other foreign matter is removed by precipitation, a coagulant being added to hasten precipitation.

OAKES TIRE LOCK.

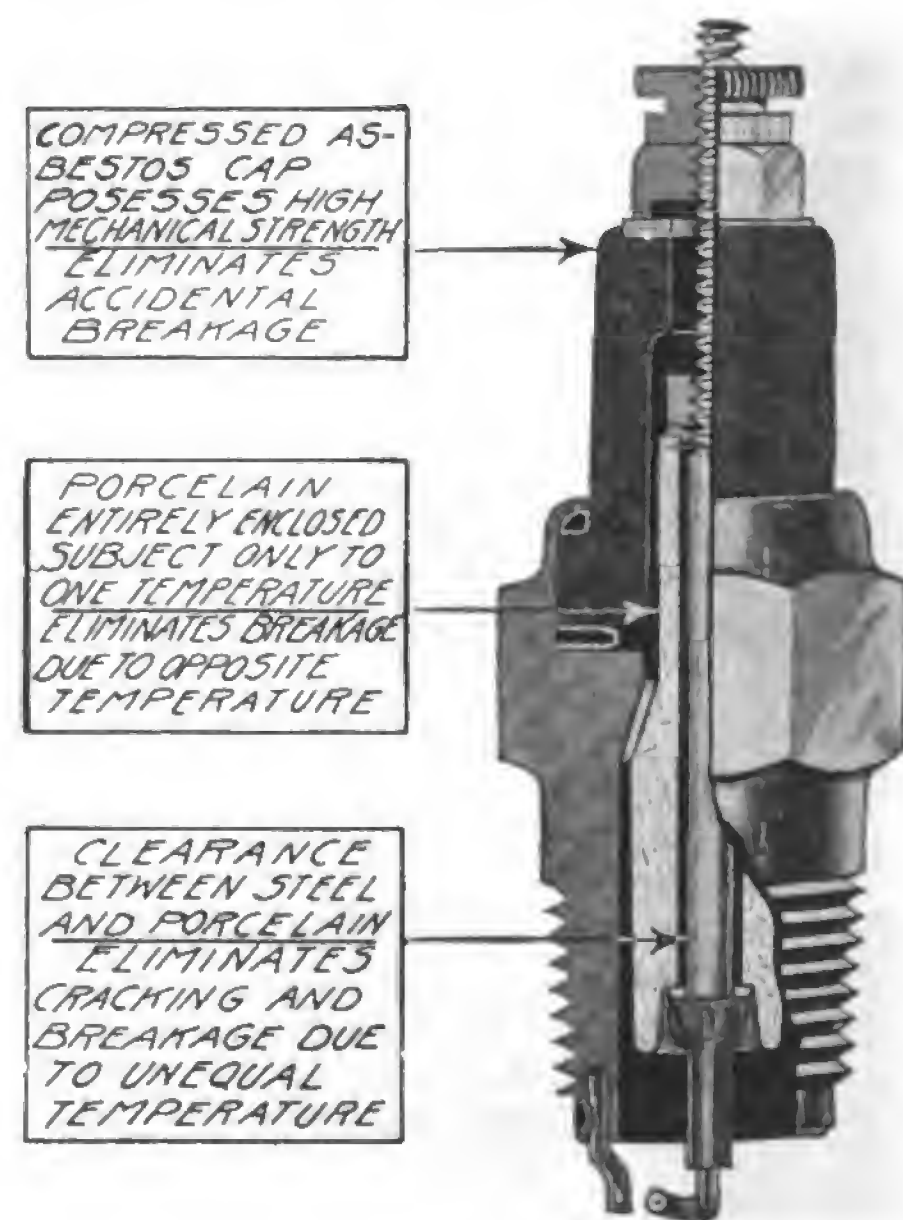
The Oakes Co., Indianapolis, Ind., announces that it has perfected a spare tire lock which really prevents theft. The new lock is furnished in four standard types, with a special model for Fords, and thus covers the needs of practically all models of cars and trucks. Two simple units form the lock, a barrel-shaped casting of malleable iron, about two inches in diameter, and a high-grade pick-proof



lock, circular in shape, which fits in the outer end of the lock housing. The rear end of the casting has a center hole through which the threaded stud, found at the bottom of most tire carriers, is passed. The nut is then replaced on the stud inside the lock housing and screwed tightly. The lock itself is then replaced and the tire is absolutely protected against theft.

DURABUILT SPARK PLUG.

The W. H. S. Manufacturing Co., 2764 Roosevelt avenue, Indianapolis, Ind., manufactures the Durabilt spark plug, which is claimed to withstand the hardest usage. The plug is especially constructed with a compressed asbestos cap,

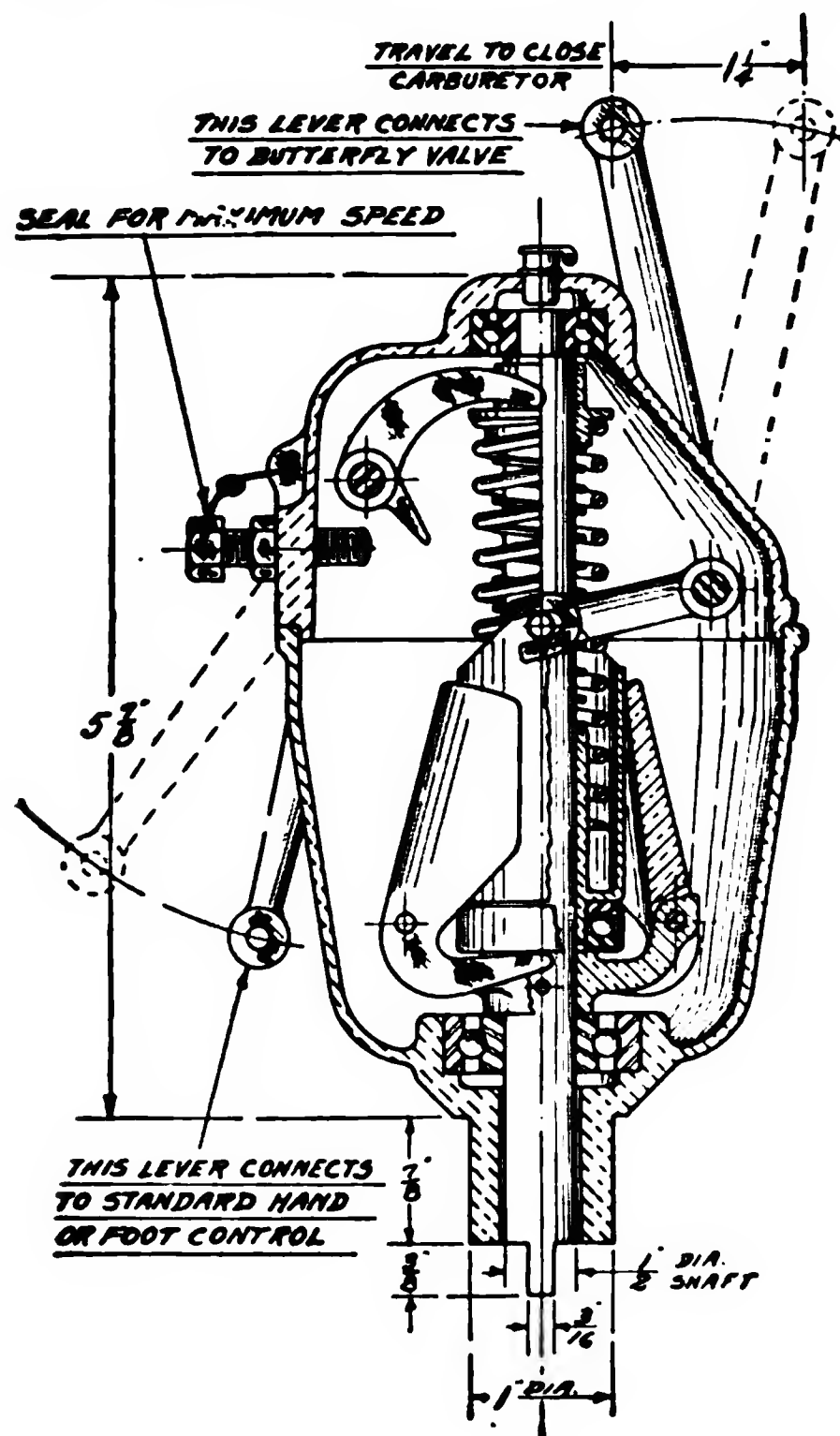


which possesses high mechanical strength. The porcelain is entirely enclosed and subject to only one temperature and there is ample clearance between the steel of the electrode and the porcelain, all of which is claimed to eliminate breakage.

"VARISPEED" GOVERNOR.

The S-W-S Co., manufacturer of automotive products, 716 Metropolitan Life building, Minneapolis, Minn., is showing its new "Varispeed" governor which can be installed on practically all makes of truck and tractor engines not already equipped. It controls the speed of the engine between certain limits.

In structural details the governor much resembles the conventional fly-ball type, having weights at each side of the center shaft which swing outward as the speed of the driven shaft increases. By means of levers and linkage the action of the weights is communicated to



the butterfly valve in the engine intake manifold admitting more or less gas to the engine as required. A second lever is connected to the governor spring, and to the accelerator pedal in the control set. The action of this lever is to increase the spring tension, allowing the engine speed to be varied at the will of the driver. A sealed set screw, near the top of the governor case, limits the action of the governor and prevents the engine from racing.

RICHMOND HAMMERED PISTON RINGS.

The Richmond Piston Ring Co., Richmond, Ind., manufactures a piston ring of special design for engines whose pistons are continually pumping oil. The rings are hammered by a patented electrical process called the "Lune," which compresses the metal, forming a ring which, when fitted in an engine cylinder, creates a perfect seal between the piston and cylinder wall, increasing the power of the engine and preventing waste of oil and gas.

A particular feature which the manufacturer especially mentions is that the rings seat quickly after being in-

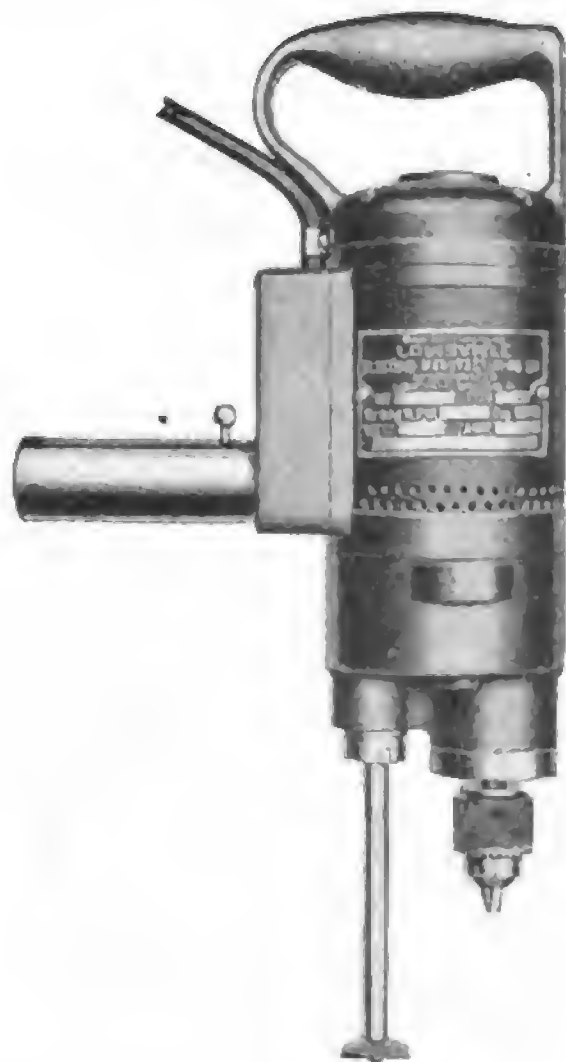


stalled on the pistons, conforming to the shape of the walls of the cylinders after a few hundred miles of road driving. An oil scraper ring is often necessary to prevent oil passing and, upon the degree of tightness of the rings in the cylinders, depends whether one or two scraper rings are to be used per piston.

NEW ELECTRICAL DRILL.

The Louisville Electrical Manufacturing Co., Louisville, Ky., announces that it is now in production with a new electrical drill known as the Garage Special, which has been developed especially for the garage and service station trade.

The new drill is one of the many items of the Pioneer line which the company manufactures which is stated to include every kind and every size of drill for every purpose for which a drill can be used. The designer and manufacturer of these tools has had many years' experience in the manufacture of tools of this

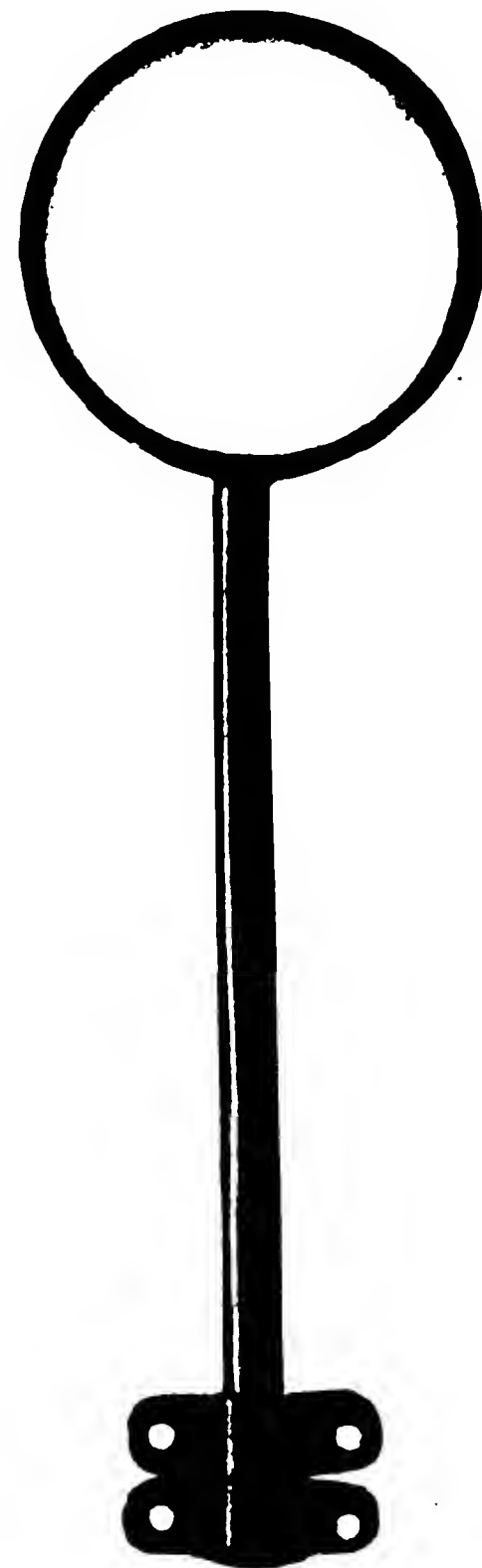


type and the tools are well known throughout the trade for their high-grade qualities.

The new drill may be operated by either alternating or direct current, has a capacity for intermittent duty of $\frac{3}{4}$ of an inch, weighs eight pounds, is 13 inches in length overall, takes a $15\frac{1}{4}$ -inch grinder tool, and is equipped with an offset spindle from the side of the frame $1\frac{3}{8}$ inches in diameter. The equipment includes an oscillating spindle for valve grinding, making the tool especially desirable for general garage service.

REFLECTOSCOPE TRUCK MIRRORS.

The Lawson Auto Specialty Co., Inc., 47-49 Bergen street, Brooklyn, N. Y., is showing its latest type truck mirror which is designed to comply with the laws of practically all states which enforce a mirror law.



The truck mirrors are strongly made to withstand vibration of the truck. The company stands behind its product with a broad guarantee that the mirrors will not become loosened by vibration.

HORSEY DUPLEX VULCANIZER.

The Horsey Products Co., 4815-21 Lexington avenue, Cleveland, O., manufactures a line of tube vulcanizers for emergency service which use a special denatured alcohol lamp burner in the base for supplying heat to the vulcanizing plate. The Model "E" shown in the

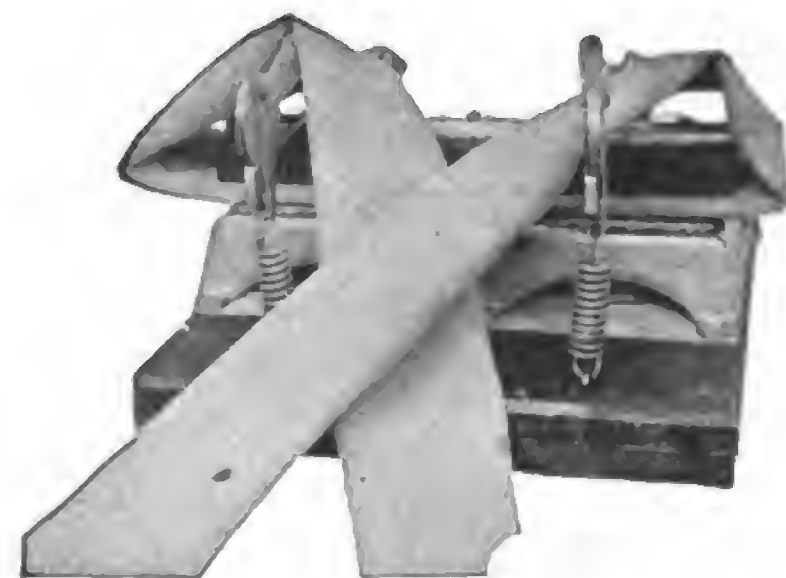


illustration is fitted with two hold-down clamps and spring tension for each and has a capacity which will make two separate inner tube repairs up to three inches in length or a single repair up to 10 inches in length. The device is small enough to carry in the motor truck tool box, allowing emergency repairs to be made on the road.

HAYES-ALL-METAL CAB IS STURDY AND ATTRACTIVE.

The Hayes-All-Metal-Cab was designed at the suggestion of several truck manufacturers for a cab which would not only serve all the wants of the individual or fleet owner, but one that would last the life of a truck without replacement.

Before placing the cab on the market a sample was tested in actual service on a truck and put over the roads for months.



The cab is entirely of steel, the various parts being made with dies so that greater strength is obtained and all parts will be interchangeable. The cab is made in three widths, 49¼, 53¼ and 57¼ inches, the last of which can be used on trucks from 3½ tons up. The doors slide on rollers and can be held wide open, half open or completely shut. The windows in the cab proper and doors can be dropped if desired. The windshield is of the ventilating type, opening either forward or back, and the cab can be opened or closed tight in a very short time in case of storm.

It is built in the Mother Hubbard type so that the dash and sills can be cut away where necessary and the cab slipped right over the dash of the truck to be used. This cuts down expense in mounting and still gives the strength every truck cab should have.

The front posts are so located that the maximum field of vision is obtained for the driver without weakening the construction.

Truck owners and operators are be-



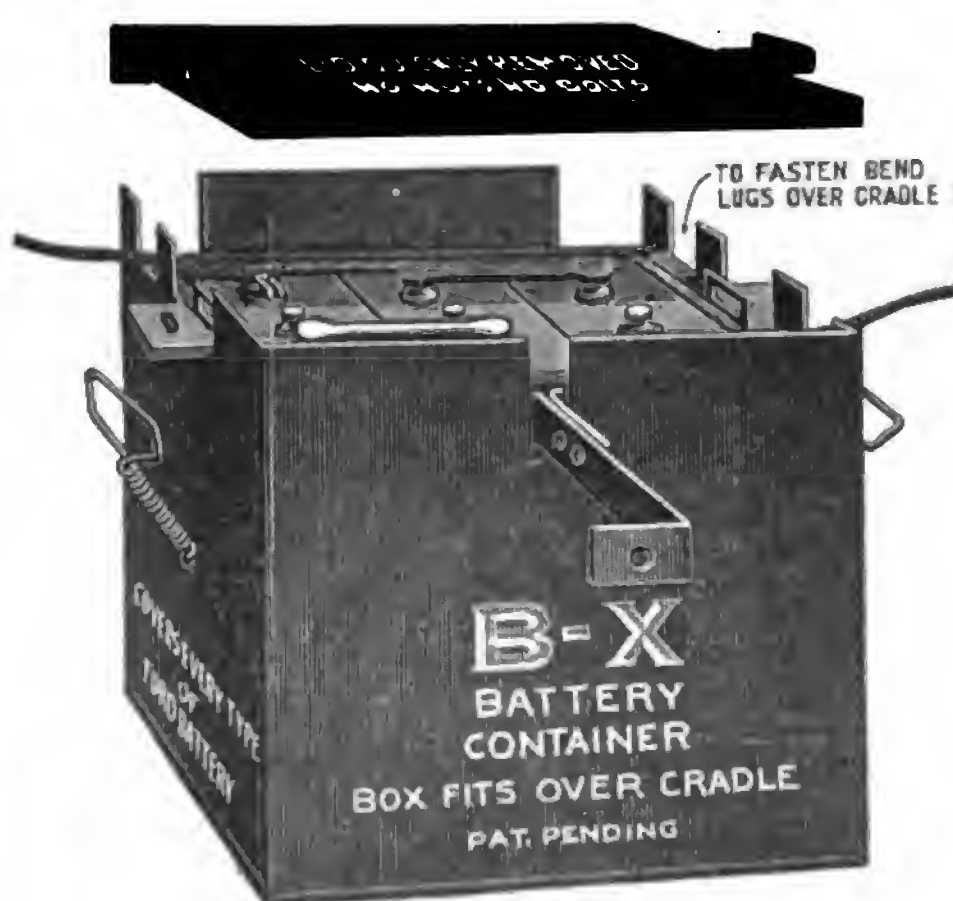
ginning to realize more every day that, by taking care of their drivers in all kinds of weather, they in turn are going to be more careful in driving and keeping up the trucks.

The Hayes-All-Metal-Cab is stated to be substantial and attractive in appearance; it adds dignity and is a good advertisement for the owner. It will stand a great amount of hard usage, has practically no depreciation and can be easily changed from one truck to another.

The Hayes-All-Metal-Cab is made by the Hayes Manufacturing Co., manufacturer of automobile body stampings, sheet metal parts and steel truck cabs.

BX BATTERY SUPPORTER.

A device which protects the storage battery and prevents the acid from leaking through has recently been placed on the market by L. C. Milner, 148 East Georgia street, Indianapolis, Ind. The metal box consists of bottom, sides and



top, made in such a manner that they easily telescope, folding into a small package for shipping. When assembled, the sides and bottom fit together easily, and the battery box is placed inside. A cover fits over the top of the battery and terminal cables, thoroughly protecting them from dust and preventing damage to the battery. Supporting handles are provided at the ends which hold the box in position in the car or truck chassis, while extension arms at the sides provide for battery support in the chassis.

AUTOGLASS TRUCK MIRROR.

Often motor truck drivers are unable to hear the horn of a passing autoist because of the noise of their own machines. By fitting an Autoglass truck mirror to the side of the windshield the driver is able to see traffic behind his truck and to govern its handling accordingly.



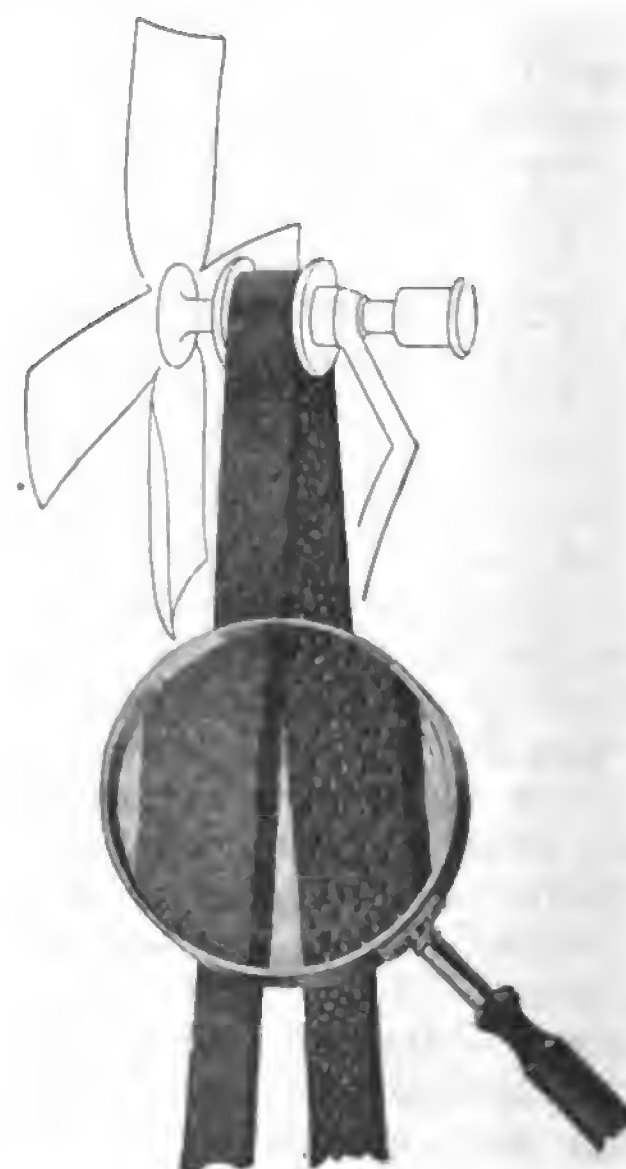
Different brackets are supplied for trucks equipped with wooden or metal windshield sides. In both cases the brackets are easily adjusted and stay tight without chattering.

Autoglass truck mirrors are made unusually strong to withstand the hard usage of truck service. They are manufactured by the Matthews Co., 145 College street, Buffalo, N. Y.

VACUUM FAN BELT.

A new principle in fan belting is incorporated in a device placed on the market by the Vacuum Belting Co., Indianapolis, Ind., which makes use of the vacuum gained by a multitude of small cup-shaped indentations on the pulley side of the belt.

It is stated that, with this type of belting, it is not necessary to run the belt tight to obtain the necessary friction.



FEDERALS IN SPANISH RELIABILITY RUN.

The great economy and efficiency that has been realized by thousands of business men and farmers throughout the entire country in following the well-known slogan of "ship by truck," is not only having its effect in this country but also in many countries abroad.



Federal Motor Truck Entered in Spanish Reliability Run Showing Type of Body and Cab Used.

This new method of marketing, its capacity as an adjunct to the railroad and an all-round saver of time and money, has been tested and proved by truck tours staged in nearly every part of this country for the past few years. The success evidenced by these tours is now far from a local affair, for in many foreign countries the same tours are being arranged with equal success. An example of this is shown in the recent tour staged by the various representative truck companies in Spain. Starting at Barcelona, a seaport town, a tour was planned by a very rough, rugged and treacherous road over the Guadarama mountains to Madrid.

A Federal two-ton truck was entered by E. Bertrand Y. Serra, Federal distributor at Barcelona. In the accompanying photograph it is seen in the court yard of the Royal palace at Madrid, after making the best speed for the 400 miles travelled, and proving the most reliable of the entire competition.

MOTOR VEHICLE REGISTRATIONS IN GREAT BRITAIN.

Statistics have been issued by the British Ministry of Transport showing that the licenses granted in that country during 1921 up to May 31 covered an aggregate of 853,900 motor vehicles.

Motor hackneys (taxi cabs) for which annual licenses have been issued, total 64,000, contrasted with 40,500 in 1920. Of private automobiles 226,000 licenses were in force on the date named, against 185,700 in the previous year; 370,000 motorcycles, compared with 278,600; and 96,500 motor hackneys (including those whose licenses are not annual), contrast-

ed with 71,400, the balance comprising commercial motor vehicles.

The annual licenses for private cars indicate an increase of 2000; quarterly licenses have grown from 14,000 in the first, to 36,000 in the second quarter of the year.

The revenue from the new motor tax, from Jan. 1 to May 31, aggregated £8,750,000 (\$42,612,500).

BIG CONTRACT FROM DURANT FOR CONTINENTAL MOTORS.

The Continental Motors Corporation has closed a contract with the recently organized Durant Motors concern for 50,000 power plants on which delivery is expected to be commenced about Aug. 1. Shipments will be made at the rate of 150 a day to Durant plants at Lansing, Mich.; Long Island City, N. Y., and Oakland, Cal., as well as to another, probably in Detroit or Flint, Mich.

LINCOLN MOTOR CO. INCREASES SALES POINTS.

The Lincoln Motor Co., Detroit, Mich., has increased its number of sales points by 800 per cent. in the last eight months, it is reported.

Starting with 15 distributors in November, 1920, the company has granted franchises to 123 additional organizations. It now has 56 distributors and 82 deal-

ers. How thoroughly this list covers the larger centers of population is shown by the fact that only one city of 200,000 population or over is not represented.

SPRAYING WOODLAND INFESTED WITH GIPSY MOTHS.

In the June issue of Motor Truck on page 316 appeared an article dealing with the fight against gipsy moths which the State of New Jersey is waging and a description of the Ward-LaFrance trucks, each equipped with Fitzhenry Guptil spraying apparatus.

The accompanying photograph shows the apparatus working in an infested area. The trucks are often located at a distance from the area that is to be sprayed, necessitating a mile or more of pipe to connect the sprayer and the nozzle spraying the woodland. This is because there are many localities infested where it is impossible to drive a truck on



Spraying Infested Gipsy Moth Area, Showing How Pressure of Pumps Forces Spray to Tops of Infested Trees.

account of the rough nature of the ground. On one occasion it was necessary to lay nearly a mile of pipe and hose line. The pump showed a pressure of 850 pounds, whereas the pressure at the nozzle was only 250 pounds, due to the friction encountered in the pipe and hose line.



Fleet of Seven 2½-Ton Clydesdales Owned and Operated by Carson Pirie Scott Co. of Chicago Between Northwestern Depot and Department Store.

HERE and THERE

EXECUTIVE COMMITTEE OF A. A. A. MEETS.

WASHINGTON, Aug. 15.—Declaring a ban upon the touring motorist who seeks road information without membership in an A. A. A. club, increasing individual membership fees to \$10, voicing emphatic opposition to any further taxation of automobiles and going on record for more and better service to motor car owners generally, were the chief results of the meeting of the executive committee of the American Automobile association held at Washington, D. C., Aug. 4.

Considerable interest was manifested in this particular meeting for the reason that it was expected that a successor to the late A. G. Batchelder would be named. However, a permanent selection for the position was not made. D. L. Morgan of New Haven, Conn., who has been acting chairman for several weeks, will continue in the position until a decision is reached.

The following members of the executive board were present at the meeting: George C. Diehl, Buffalo; J. L. Will, Columbus; George H. Kile, Akron, O.; Fred H. Caley, Cleveland; F. F. Bentley, Warren, O.; H. G. Shirley, Towson, Md.; Thomas G. Young, Baltimore; William Schimpi, Brooklyn, N. Y.; F. A. Crosel-mire, New York City; Arthur Flfoot, Hartford, Conn.; D. L. Morgan, New Haven; S. Edward Gable, Lancaster, Pa.; W. S. Gilbreath, Detroit; Hon. Clifford Ireland, Peoria, Ill.; Kane S. Green, Philadelphia; M. L. Heminway, New York City; L. L. Lewis, Jr., Buffalo; Richard Kennerdell, Franklin, Pa.; D. R. Reese, Scranton, Pa.; Horton Weeks, Chester, Pa.; Albert L. Terstegge, Louisville, Ky.; David Jameson, New Castle, Pa.; F. B. Bosch, Harrisburg, Pa.; Dr. H. M. Rowe, Baltimore; William A. Jensen, Scranton, Pa., and H. A. Bonnell, Newark, N. J.

CHICAGO TRIES UNIQUE PLAN.

CHICAGO, Aug. 15.—A unique method of instructing chauffeurs and truck drivers was followed by the Chicago Safety Council in the conduct of its motor drivers' safety instruction course which recently concluded its operations for the season. It is believed that the plan will result in a decided diminution of motor vehicle accidents in Chicago which, up to this time, have been steadily mounting until the record of death and injury is a startling one.

"Getting out an average attendance of 600 of these men," said Henry J. Bell, secretary of the safety council, "was no easy task, for many of them, after a long and hard day's work, came 10 to 15 miles to the meetings, sometimes attending in their working clothes because they did not have time to go home after work.

"The men soon came to realize that the meetings were not only instructive, but entertaining as well. For we provided 30 minutes of entertainment at each meeting, this including special talent engaged for the purpose and community singing. This especially appealed to the men. At each meeting the men were addressed by a public officer, such as the coroner, the instructor of the police department, the chief justice of the municipal court, the state's attorney, the assistant United States district attorney and the judge of the automobile court. This was followed by a talk on some semi-technical subject by an expert, whereupon the meetings were turned open to a free-for-all discussion. These men consequently were given

FLIVVER ENTERS A CHURCH.

Dashes Through Doors as Assembly Kneels in Prayer.

EVANSTOWN, ILL.—Aug. 14.—A flivver truck, repentant for its crimes, sought peace in church here last prayer meeting night.

Just as one of the members arose with the announcement, "Let us pray," a truck of a prolific make dashed through the door and into the assemblage. The driver frantically endeavored to stop it. Women were thrown into a panic.

The machine bumped a post, which threw it into reverse, and it suddenly backed out the door and sped away into the night.

a thorough instruction in safety, rules of the road, loading, braking and operating of motor trucks.

"Diplomas or certificates of attendance were awarded to 469 men who had attended these meetings regularly.

"That the course will accomplish definite and lasting results is evidenced by the interest and enthusiasm of the men who daily hold the fate of thousands of pedestrians behind the wheels of their vehicles. They have pledged themselves to safer driving, courtesy of the road and strict adherence to traffic regulations, to the end that Chicago will be a safer and therefore better city in which to live and transact business."

THREE JUDGES WILL AWARD SCHOLARSHIPS.

WASHINGTON, D. C., Aug. 13.—Three distinguished judges, each widely known in his individual field, will constitute a national committee to award the four years' university scholarship offered for the best essay written on the subject "Good Roads and Highway Transport," in a national contest among high school pupils conducted under the auspices of the Highway and Highway Transport Education committee, which has headquarters here.

According to the announcement of the committee the judges will be Dean A. N. Johnson, Department of Engineering, University of Maryland, chairman; Harford Powel, Jr., editor of Collier's Weekly, and C. H. Huston, assistant secretary of the Department of Commerce and president of Lee Highway association.

Upon the decision of these judges rests the hopes and ambitions of tens of thousands of high school boys and girls from every state in the Union. During the last six weeks offices of high school principals and city and state superintendents of schools have been deluged with essays and manuscripts.

MUST REDUCE BANDIT HAZARD.

NEW YORK CITY, Aug. 15.—There are distinct advantages in shipping by truck, but the theft risk is too important to be ignored. A great deal of stuff is stolen during transit on railroads, but in proportion to the value of goods carried it is probable that losses are greater from trucks than from steam cars.

Fifty million dollars is the valuation placed by insurance officials on merchandise stolen during the past year while being transported by motor truck within a radius of 200 miles from New York. The announcement follows the seizure of \$30,000 worth of silks from a truck on a lonely spot in the road near Newton, N. J., and the killing of a passing motorcyclist who did not heed an order of the bandits to halt.

If truck transport is to be developed, and it is reasonable to expect that it will be because of quicker service and a big saving in handling, measures will have to be devised to reduce the bandit hazard. It is proposed to send trucks out in squadrons with armed motorcyclists to accompany them as a guard; and to arrange, along much travelled highways, a system of reporting stations, at which it will be known when a squadron is due, and from which an alarm can be sent out if it fails to put in an appearance according to schedule. The state, for its part, should afford reasonable police protection, which can best be done through a force of mounted men.

CLARK-TURNER PISTON COMPANY INCORPORATES.

LOS ANGELES, CAL., Aug. 12.—All things, big and little, must have a beginning, it is said, and since the automotive industry at large has undergone an unparalleled development during the last 20 years, there are naturally many instances of unusual growth among concerns manufacturing or selling automotive products.

However, aside from war-time activities and exclusive of those factories mobilized by the government for the production of munitions, automotive machinery and incidentals, it is believed that there is not a single example of rapid growth equal to that of the Clark-Turner Piston Co. within the past two years.

Previous to Aug. 1, 1919, Edward W. Clark, an engineer and inventor of long experience, was manufacturing and supplying Deluxe light weight gray-iron pistons in a small way in and around the city of Los Angeles. His product and its performance very fortunately attracted the attention of Stanley S. Turner, at that time distributor for a well-known automobile, and so thoroughly was Mr. Turner sold on the merits of Deluxe pistons and their performance that he immediately disposed of his automobile business and joined Mr. Clark in the organization of the Clark-Turner Piston Co., starting Aug. 1, 1919, as a copartnership.

Then Deluxe pistons were placed on the market nationally, meeting with so ready and satisfactory a response that plans were at once laid for the development of a large business. From Aug. 1, 1919, to June, 1921, the concern grew from a mere handful to over 400 employees, requiring during that time numerous additions to the original factory and finally being forced to purchase a site and to erect a large and modern factory and also building up a tremendous demand for Deluxe pistons, extending not only to every section of the United States, but to Mexico and Canada, and many foreign countries as well.

The capital stock is \$1,000,000. The officers of the company are: President, Edward W. Clark; vice president and general manager, Stanley S. Turner; sec-

retary and treasurer, Fred C. Galloway.

The board of directors is composed of these officials and other representative business men.

As great as has been the success of this concern, plans are being laid for an unlimited development and in the words of Stanley S. Turner "What has been

MEXICO PUTS TAX ON AUTOS.

Import Duty of About 50% of Cars' Value Announced.

HOUSTON, TEX., Aug. 11. L. Garza Leal, Mexican consul, declared in a statement today that President Obregon, by executive decree, effective Aug. 1, imposed an import tax on vehicles amounting to approximately 50 per cent. of the value of popular-priced American cars now being shipped into Mexico.

The tax, according to Senor Leal's advices, is 75 centavos (about 37½ cents) a kilogram for the first 250 kilograms weight; 60 centavos a kilogram for the next 500 kilograms, and 50 centavos a kilogram for every kilogram over 750 kilograms. It would mean in American money a tax of apparently \$330 on a car of 1650 pounds weight.

done is only a starter."

The modern new factory, illustrated herewith, has a floor space of approximately 50,000 square feet, with ample room for further development. Since moving into the new plant the production of Deluxe pistons has been tremendously increased, which promises unusual service facilities to distributors, dealers and owners.

TAXICAB FLEET STANDARD WITH VIM CABS.

BOSTON, MASS., Aug. 13.—After a number of years of careful investigation, which covered a survey of practically every light truck on the market, the Armstrong Transport Co., which is one of the largest companies operating in Boston, has decided to standardize its equipment on Vim taxicabs, which are distributed through the Vim Motor Truck Co. of New England, with headquarters in Boston. George W. Taggart, general manager of the New England Vim Co., states as follows:

"The company has been experimenting for some time past with the idea of standardizing when they found what they believe to be the right car for their business. They keep very accurate cost record and they can tell to a penny what each and every one of their vehicles is costing them. Their decision to standardize on Vims is based on the proven ability of this chassis to stand up under all kinds of abuse, their freedom from repairs and low upkeep cost.

"A taxicab to be serviceable must be rugged enough to stand up under hard usage, must travel night and day all the year around, in all kinds of weather, usually over rough cobble-stone roads, at greater than ordinary speed, and it must be economical on gas, oil and tires, and the fact that the Armstrong Co., after careful investigation, has decided to cast their lot with Vim, which means an investment of practically \$150,000, is a wonderful testimonial to the ability of this truck to stand up and render service at little expense."

BIG FOREIGN MARKET FOR TRUCKS.

MOUNT PLEASANT, MICH., Aug. 13.—That the motor truck business is soon due for a marked impetus abroad, as well as in the United States, is the firm belief of Transport Truck Co.

This company has operated steadily through the period of readjustment and has not only developed markets at home, but has made promising connections at foreign points. By arrangement recently concluded, Keegan Aprahemian & Co. of New York will take care of Transport business for China, Japan, Philippine Islands, Dutch East Indies, French Indo-China, Federated States of Malay, Straits Settlements, Burma, Ceylon, India, Persia, Egypt, Arabia, Siam, Australia, New Zealand, Tasmania and South Africa.

"The motor truck business is due for a steady increase from now on," said F. D. Engle, sales manager of the Transport Co. "With unmistakable signs of a break of the deadlock in leading lines of industry, the impulse will be felt emphatically in the demand for trucks. Every business depends upon them.

"We have found that intensive salesmanship goes far to overcome apathy. Shrewd heads of business realize that marking time can be only a temporary interruption—and they are getting ready now to move forward. We will have all the business we can handle—at home as well as abroad."



New Factory of Clark-Turner Piston Co., Los Angeles, Cal., Has Floor Space of 50,000 Square Feet.

"SCOTT'S MODERN CARAVAN" REACHES CLEVELAND.

Western Bound Prairie Schooners Making Good Time to New Home in Idaho.

CLEVELAND, O., Aug. 12.—A demonstration of their faith in the advice of Horace Greeley will be staged this evening when the vanguard of "Scott's Modern Caravan," en route from Brooklyn, N. Y., to Buhl, Ida., camps for the night at Edgewater park.

Not for these pioneers, however, are the discomforts of the prairie schooner of '49. Instead, the modern caravan includes all the comforts of home, and then some, even to the open-work plumbing.

For this caravan is travelling in the approved 20th century fashion—by automobile. But the automobile is not all. Each of the 35 cars in the advance guard is equipped with a "bungalow trailer," providing sleeping accommodations for six persons, living room, dining room, kitchen and sun porch.

There are to be 100 cars, carrying 400 persons, in the whole party. The 20th century adventurers are not travelling on a shoe string. The head of each family in the caravan was required to have \$4000 in cash before being permitted to join.

The money was to insure each family's subsistence for the year it will be required to cultivate the 40-acre tract the family is to take over in the Snake river country, 17 miles from Buhl.

Settlers Purchase on Time.

The land is all irrigated, guaranteed to produce record crops of wheat and alfalfa, and is being held on land contracts by the State of Idaho at \$125 an acre, on a purchasing plan of \$25 an acre down and 10 years' time at six per cent. on the balance.

William D. Scott, commander-in-chief of the caravan, will be with the advance guard today. The party left Niagara Falls, N. Y., Saturday and will reach here late today.

Scott, who was elected chief of the caravan, for a number of years has been a prominent business man in Brooklyn. Tiring of city life, early in March he decided to migrate to the West. A tour of several western states convinced him Idaho was the place, and he arranged to take over land.

Scott's friends in Brooklyn immediately became interested. The plan proved contagious and the caravan was organized. It comprises men of various professions and numerous lines of business, and the colony intends to be self-governing and has a programme of education and other civic activities already mapped out.

Jess O. Eastman, representing the Buhl Chamber of Commerce, the Buhl Rotary club and the State of Idaho, arrived here Saturday to arrange for the stop-off in Cleveland.

Encounters Highwaymen.

Eastman had been travelling in advance of the party since it left New York on July 28. He decided, he said, to stay with the crowd from now on.

After leaving Yonkers, N. Y., Eastman said yesterday, he was driving alone on the state road for Albany, when another automobile came from behind. The driver

of the other car signalled to Eastman, he said; and as he turned he found a man on his running board with a gun levelled at his face. He was ordered to drive to a side road, where two men robbed him of \$120 in cash.

They left his watch and when Eastman tried to offer the watch in trade for his card case, which the robbers also took, they refused. State constabulary travelled with the caravan across New York state, and arrangements have been completed for similar convoys en route.

HAUNTED AUTO KILLS THREE.

Casualties Follow Ownership of Car of Ex-Kaiser's Dead Son.

HEIDELBERG, GERMANY, Aug. 4.—Is an evil spirit haunting the automobile formerly owned by the late Prince Joachim of Prussia?

After the death of the ex-kaiser's son a year ago the car was bought by a wealthy German. It had not been in his possession long before the chauffeur ran over and killed a child. The owner, having superstitious fears, sold the car to another German, who hired a new chauffeur, but the same thing happened again, and another person was killed. The car changed hands once more, and again a pedestrian lost his life by being run over by the ill-omened automobile.

Yesterday a telegram was received from Cologne saying that the same car had figured in still another accident, when the new owner—the fourth since the death of the Hohenzollern prince—was hurt in a collision with another automobile. That the haunted car will find a fifth owner is doubtful.

The Brooklyn Rotary club gave the caravan a banner with the first stripe of the American flag. Rotary clubs en route will add stripes and stars and it is planned to have the last stripe added by the Buhl Rotary club when the party reaches Idaho.

Eastman is a brother of O. M. Eastman, supervisor of school gardens of the Cleveland board of education.

BIG OIL RESERVE IN SHALES.

WASHINGTON, D. C., Aug. 10.—Recent investigations by the United States geological survey, are held by its experts

to indicate that in the Rocky Mountain states, "there are enormous quantities of oil shales which can be made to yield hydrocarbon oils to a much greater extent than we can hope to obtain from our oil wells." The shales are said to constitute a tremendous potential oil reserve.

"The oil shales of this country," says the report, "contain enormous quantities of oil, but large amounts of money will have to be invested before the oil-shale industry becomes of commercial importance. Estimates by various engineers of the cost of a complete retorting plant, handling 1000 tons daily, are between \$4,000,000 and \$5,000,000."

The report declares that it is "unfortunate that a large number of the many companies organized to deal with oil shale are devoting their efforts to stock selling rather than assisting in building a firm basis for the industry." There are no commercial oil shale plants operating in this country at the present time, although there is a well established industry in Scotland.

TEST BUSES AT IOWA CITY.

DES MOINES, IA., Aug. 13.—John Budd, commissioner of Public Safety, today announced he would back the plan to give busses the sole franchise on Des Moines streets.

This action was taken to mean that motor transportation instead of street cars, had been successful here.

It's motor busses against street cars in Des Moines, with the prospects right now that the motor busses will win.

Thus this city of 100,000 furnishes a laboratory for a new experiment in transportation.

Motor busses have put the street railway system out of running here by cutting into its revenues so that even eight-cent fares did not pay. Now the busses are trying to do the street railway's work.

If they succeed they have a good chance of winning from city council a five-year franchise at the expiration of their present licenses, Sept. 1. The situation in which Des Moines finds itself results from five years of warfare between the city and the street railway company.

Fare Increase.

The situation began to come to a crisis in 1918 when the company, operating under a five-cent franchise, asked six-cent fare. Council refused the increase. The people also voted it down.

Then the company went into a receivership. The Supreme Court held that council had no right to fix rates in a franchise and on the strength of this ruling Federal Judge Martin J. Wade increased the fare to six cents.

The company continued to lose money, so Judge Wade last December boosted the fare to eight cents.

This was the signal for the invasion of the busses. They charged only five cents, paralleled the car lines and skimmed the cream.

Scott Henry Tolman, president and treasurer of the Tolman Manufacturing Co., 19-21 West Third street, Boston, died recently.

FORD'S RAILROAD MAKES \$500,000.**Detroit Earns Profit on Losing Venture.**

DETROIT, Aug. 15.—Ford ownership of the Detroit, Toledo & Ironton railroad has turned a consistent deficit into an operating profit of more than \$500,000 in the first six months of 1921, officials of the road said today.

"We are doing a whale of a business and it's growing, along with our vast improvements, every day," said the official. "Aside from doing with the road's financial condition what railroad men all over the country said was impossible, Henry Ford is working other wonders."

Two hours have been cut from the running schedule between Detroit and Bainbridge, O., 280 miles. The trip is made in 10 hours with 28 scheduled stops.

By speeding up shipments on his line Mr. Ford says he has cut the time when raw material leaves the manufacturer until finished automobiles reach the dealer from an average of 22 to 14 days. This freed \$22,000,000 in inventory for other purposes.

Ford freight is so heavy that some other business is being refused according to trainmen. Yardmen say that in a few instances as many as 1200 cars have been handled in 12 hours. The old D. T. & I. record was 200 in 24 hours.

Ford's pay scales provides for a maximum of eight hours work each day in a six-day week with a minimum of \$6 a day. Monthly pay schedules are: Engineers and conductors, \$375; firemen, \$275, and brakemen, \$235.

There is no overtime. When a man completes his 208-hour month he is laid off until the first of the next month.

YIELDING PRICES APPEAR IN STEEL.**Quotations Are Made to Get Business When Attractive.**

NEW YORK, Aug. 15.—The Iron Age tomorrow will say: "The latest transactions in steel products have shown substantially the same low prices that were uncovered the previous week with here and there a new decline, sheets and plates apparently being the lines of least resistance. Willingness to name a price that will take the business, where the tonnage is larger than usual, is still the attitude of the leading steel companies, albeit sentiment is better in view of a somewhat larger volume of orders and inquiries and the feeling that improvement in other industries will soon be felt in iron and steel.

Some publicity has been given to what is called a new and lower schedule of prices by the steel corporation, particularly on bars, plates, shapes, tin plate and sheets, but the figures given have been the basis of ordinary transactions for more than a fortnight.

The general average of steel mill operations in the Pittsburgh, Youngstown and Wheeling districts is somewhat higher this week, due largely to the starting of departments that have been idle in some cases several weeks. Maintenance of the new rate of activity is dependent in most

cases on developments of the next few weeks.

The returns of July pig iron production confirm the week to week reports last month that iron and steel works operations were declining. In the 31 days of July 864,555 tons of pig iron were made. This was at the rate of 27,889 tons a day, or more than 20 per cent. less than the June rate of 35,494 tons a day, the June total having been 1,064,833 tons.

Not since December, 1903, nearly 18 years ago, when 846,695 tons were produced, has the country seen so small a pig iron output as last month.

July showed a net loss of seven in active furnaces, 69 being in blast Aug. 1 with a capacity of 28,175 tons a day

RADIO AUTO TRIED OUT.**New Driverless Car Amazes Dayton Traffic Police.**

DAYTON, O., Aug. 5.—Dayton traffic police met their match today when a miniature automobile passed street intersections in the downtown district and violated all "stop," "go" and "no left turns" signs. There was no driver in the car and they had no one to order into court.

Their anger was calmed when they learned it was a driverless radio automobile from McCook field, which was operated by a radio operator in a car 100 feet behind.

The automobile, itself, contained no wireless outfit and is the first car of its kind to be publicly exhibited by the radio air service.

against 76 on July 1, representing a daily capacity of 32,195 tons. The July output was at a yearly rate of about 10,000,000 tons, or not far from 20 per cent. of the country's capacity.

Pittsburgh, Cleveland and Chicago reports agree as to continuing irregularities in nearly all finished products. Some bars have been taken at 1.70c Pittsburgh; in Chicago, 1.60c to 1.70c, Pittsburgh, on plates has been the usual range, whereas Cleveland reports 1.70c to 1.75c. Smaller transactions are \$2 to \$3 a ton above levels.

OBREGON DELAYS OIL BILL.

MEXICO CITY, Aug. 10.—President Obregon has not as yet forwarded to the chamber of deputies his suggestions for the modification of article 27 of the Mexican constitution, which nationalizes deposits of petroleum.

The Liberal-Constitutionalist party, which dominates the chamber, recently sent a committee to the President for the

purpose of laying before him proposals relative to legislation affecting article 27, and it is understood that suggestions from President Obregon will be taken up at a caucus of the party before being presented to the chamber.

Plans for the consideration of this legislation had been made by the chamber of deputies yesterday, but when the roll was called it was found there was not a quorum present and the house adjourned until today.

HOWARD ELLIOTT SEES PROSPERITY FOR COUNTRY.

NEW YORK, Aug. 13.—Howard Elliott, chairman of the Northern Pacific railway, was optimistic today on his return from a 6000-mile tour of the Pacific Northwest and Canada.

"Everywhere I went," he said, "there was a feeling of hope and belief that conditions would be better, and in few places did I find any feeling of pessimism. The economic upheaval in North Dakota seems to have done its worst.

"The outlook for agricultural production is good. Minnesota crops will be above the average and North Dakota's will be considerable, although the excessive heat and drouth of the last three weeks have reduced the prospects. Montana, Idaho, Oregon and Washington will have a production in grain, grasses and fruits above the average. Crops in the northern Pacific states will be good, taken as a whole."

TO BID AGAINST HENRY FORD.

WASHINGTON, Aug. 15.—The company expected to bid against Henry Ford for the Muscle Shoals, Ala., nitrate plant is the Alabama Power Co., it was learned authoritatively today.

The company is said to represent powerful New York banking interests. The bid has not yet been received.

It also was learned that a group of financiers, including the DuPont interests, had drawn a bid, but found they could not top the offer of Henry Ford. Negotiations now are said to be going on between this group and the group reported by the Alabama Power Co.

Developments on Muscle Shoals are expected upon the return to Washington of Secretary of War Weeks next Wednesday. Weeks has been entertaining President Harding at a summer home in the New Hampshire hills.

PRICE CUT ON CYCLONE TRUCK.

GREENVILLE, S. C., Aug. 10.—The Cyclone Starter & Truck Co., Greenville, S. C., manufacturer of the Cyclone motor truck, air starters, etc., has announced a price cut of \$115 on the new Model A Cyclone truck. This price includes steel cab, top with curtains, speedometer, etc.

HEADS STEEL COMPANY.

BRIDGEPORT, O., Aug. 13.—Charles J. Hunter, has been elected president of the Wheeling Steel & Iron Co., which has mills in Ohio and West Virginia. He was formerly treasurer.

How Ball Bearings Are Made

Manufacture of Steel Balls Requires Skill—Expert Knowledge of Steel Alloys and Hardening Processes Also Essential.

MOTORISTS and service station repairers often do not realize the importance that ball bearings play in the economical operation of a car, truck or tractor. Failure in this detail leads to troubles which sooner or later cost money and replacement of bearings. Lubrication plays an important part in the successful operation of bearings of a vehicle and strict attention to

also in the transmission to support the main and counter shafts.

Single-row annular ball bearings are used in the front wheels, on the inner end of the propeller shaft forming the pinion bearing, and at each side of the differential supporting the differential gears and axle shafts.

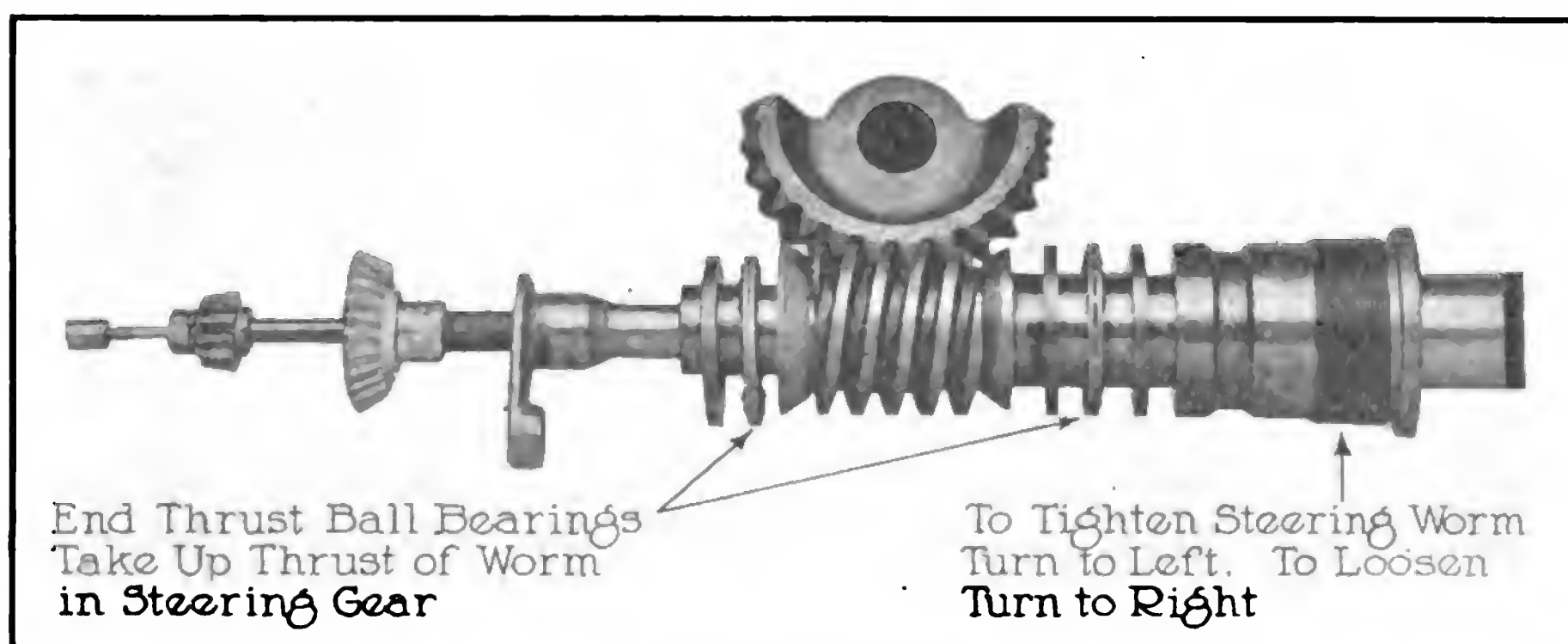
There is no set rule as to the location of ball bearings in a chassis, as each

manufacturer solves this problem to his own satisfaction. One will use a roller grade and to harden it properly. High-carbon chrome alloy steel is stated to be unquestionably superior to all other kinds, and it is used exclusively in the making of ball bearings by many manufacturers. The hardening of this steel is a most delicate operation and if it is not exactly right the chromium and high-carbon content will inevitably cause it to be brittle. On the other hand, when the correct method is followed hardness combined with toughness will be imparted, both of which properties are essential in ball-bearing steel.

In order to obtain the best results, specialization is essential. Manufacturers making steel balls for bearings maintain an elaborately equipped laboratory where experiments are conducted under the direction of a skilled metallurgist and capable assistants. In addition to the research work, every bar of steel used in the manufacture of ball bearings is systematically tested, scientific methods of heat-treating and hardening have been evolved, and a staff of trained metallurgical inspectors examine the several parts of every bearing during the manufacturing process.

An indication of what has been accomplished by the metallurgical department in the development of scientific methods of hardening ball-bearing steel may be had by comparison of the results obtained with those secured by the metallurgical department of a prominent manufacturer of alloy steel.

In examining the structure of the sam-



Ball End-Thrust Bearings at Each End of the Worm in Steering Gear Occupy a Very Important Position, Allowing the Worm to Be Turned Easily and Greatly Facilitating Steering the Car.

this detail helps the owner to obtain the service which is his due.

However, this item, while highly important, is more than offset by the still greater detail of the correct manufacturing principles involved in the making of the balls which are used to form the complete bearing.

There are two types of bearings used in the average motor vehicle, divided into several sub-types, each being designed for a special use. For instance, there is the radial type bearing composed of small balls, which is used principally for taking end thrust. This bearing consists of several small balls held in a steel separator and fitting between two steel rings, each grooved to form a ball race, the three sections of the bearing making a unit, which is so placed that the bearing takes care of whatever end thrust is present in the working part. Bearings of this type are placed at the top or bottom ends of the worm in the steering gear, in the clutch bearings and in many other parts of a chassis where end thrust is liable to be excessive.

Annular Ball Bearings.

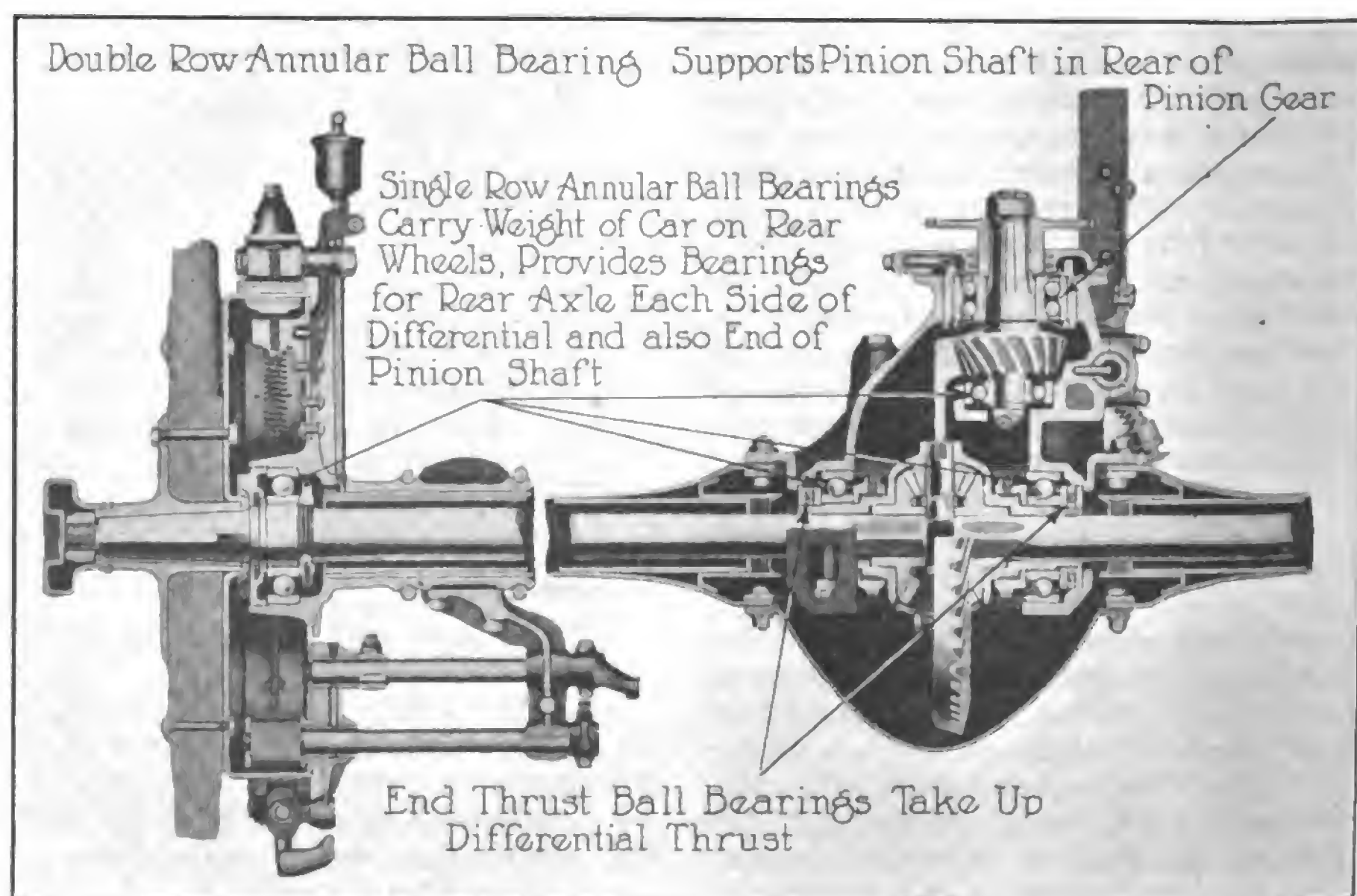
Single and double annular ball bearings are used in the chassis to carry load or weight, and are principally found in such parts as the rear axle system, propeller shaft, transmission, etc.

Bearings of the double annular type are used largely for the outer and occasionally inner bearings of the axle, the outer bearing of the propeller shaft and

bearing of either tapered or straight design, another will employ double-ball annular bearings for the same location, and still others a combination of the three types.

High-Carbon Chrome Alloy Steel Best for Ball Bearings.

In the manufacture of steel balls great care is exercised to use steel of the right



The Use of Double-Annular and Single-Annular Ball Bearings in the Rear Axle System Reduces Friction to a Minimum and Allows a Large Percentage of the Power Developed by the Engine to Be Delivered to the Driving Wheels.

ple shown in the illustration, Figure 1, which is a micro-photograph (magnification 520) of a piece of bar stock which was hardened by the manufacturer of alloy steel. The large white spots indicate segregations of undissolved chromium carbides, resulting in a rather coarse structure. A piece of steel thus hardened would probably be somewhat brittle and, therefore, unfit for ball-bearing manufacture.

In figure 2 is shown a micro-photograph (magnification 520) of the same sample of steel after being re-hardened. Considerable improvement may be observed in the finer structure of the fracture.

Figure 3 is a micro-photograph (magnification 520) of a sample from the same bar of steel as the above, but which in this case was hardened by the metallurgical department. It will be observed that the white spots are much smaller and more uniform. In other words, the absorption of the chromium carbides by the steel is much more complete. This piece of steel combines the hardness, toughness and strength essential in ball-bearing manufacture.

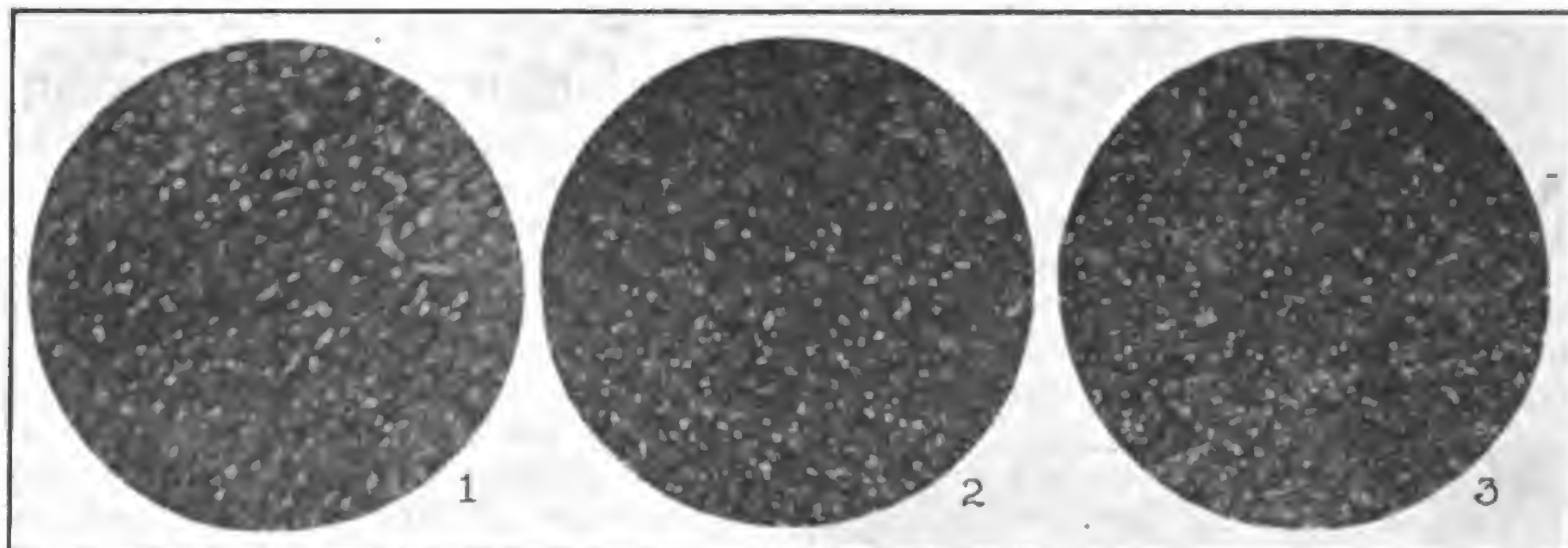
The practise is followed in manufacturing making ball bearings of cutting off a small circular disc of steel from each one of the bars of stock as they arrive from the alloy manufacturer. The stock clerk marks the ends of the bars of steel with paint, using a private code denoting the kind of alloy in the steel, and also marks the disc to correspond. The bar goes into the stock rack until it is taken out for use and the sample disc is sent to the metallurgical department for testing. In this manner the two de-

blanks. After the blanks have been made they pass through essentially the same manufacturing operations, except in the case of extremely large balls.

The blanks are first subjected to the dry grinding operation. Here they are ground between an eccentrically placed iron ring and a carborundum wheel re-

automatically to return again later. This is done under a definite pressure and continues until the balls again are cleaned before being taken to the oil grinding department.

After Hoffman grinding the balls are oil ground. On the oil-grinding machines the balls are revolved in and supported



1, Hardened Bar Stock Steel Alloy Magnified 520 Times, Showing Coarseness of the Alloy; 2, Micro-Photograph, Magnified 520 Times, Showing Improvement in Mixture; 3, Micro-Photograph, Magnified 520 Times, Showing Sample from Same Bar of Stock After Treatment in Metallurgical Department.

volving in opposite directions. This removes most of the excess metal and gives a closer approximation to sphericity.

Heat-Treating Between Operations.

Subsequent to the rough and finish dry grinding operations the balls are heat-treated in rotary furnaces. In the hardening, in order to insure a uniform quality of product, the balls are fed from a hopper that delivers a predetermined amount into a spiral retort, which conducts them through the furnace and discharges them, when heated to the proper temperature, into a spiral quenching bath which may be either oil, water or brine, according to the size of the ball.

During the process of hardening, internal strains are set up in the balls, and it is necessary to relieve these strains without affecting the surface hardness. This is done by seasoning the balls in boiling water. The increase in the crushing strength of the balls after seasoning is considerable. At the same time the heat absorbed during this process dries the balls very quickly, so that surface oxidation does not take place.

The balls then are taken to the tumbling room, where the scale formed during the heat treatment is removed. This is accomplished by tumbling the balls in barrels containing a mixture of oil and abrasive. The barrels revolve, and this causes the balls to roll over each other while submerged in the abrasive mixture. In this manner the balls themselves soon remove the scale. They are then cleaned in saw dust in a machine especially designed for the purpose, after which they are taken to the Hoffman department.

Hoffman Machine Increases Production.

The Hoffman machine is constructed with a view to producing, commercially, a large quantity of spheres that will be exactly uniform in size. The balls are ground in this machine between a cast-iron grooved plate and abrasive stone. The abrasive stone revolves while the balls are fed continuously down a runway that supplies them to the grooves of the iron rill plate. The balls pass around the grooves once and then are removed

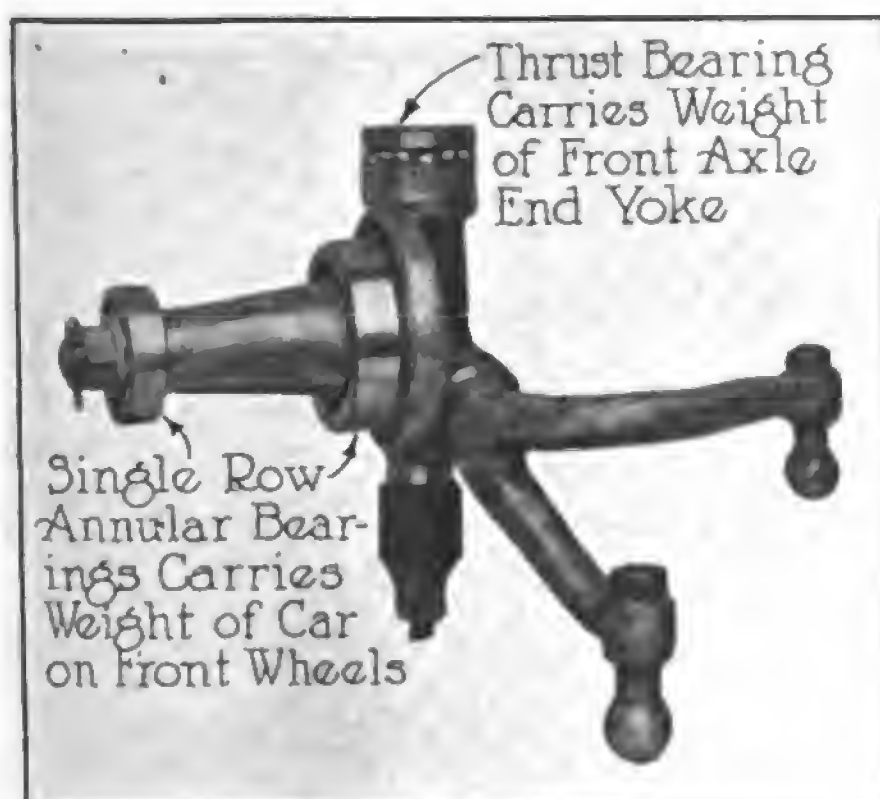
by a groove in a cast-iron ring. At the bottom of this groove is a small oil channel which assists in distributing the oil and abrasive. The cast-iron ring, which revolves when the machine is in operation, rests upon the upper surface of the balls. The groove is filled with a very high grade of oil and abrasive, so that in operation the balls and the lower portion of the revolving cast-iron ring are submerged. This machine removes any cuts or scratches which may be produced by the Hoffman machines. The amount of stock removed at this stage is very small, the main idea being to preserve the accurate sphericity of the balls, at the same time bringing their surfaces to a higher degree of finish.

After the balls have been ground down to the proper diameter they are cleaned and then go into specially designed barrels containing a mixture of oil and Vienna lime, which gives them a preliminary polish. After again being cleaned in saw dust, in a machine of design similar to the one previously referred to, the balls are rolled in kegs containing strips of soft kid, which, while thoroughly drying them, gives a brilliant polish and prepares them for the inspection department.

The final inspection takes place in large, airy rooms. The balls are given their first examination on "inspection plates," which are made of glass and coated with black paint. A reflector set up in the back of each plate throws light on the balls beneath, a strip of bristol board being moved back and forth. Care is taken that standard balls and production balls are gauged at the same temperature so that the heat expansion variation is taken care of.

After this inspection all Hoover microchrome balls are guaranteed to be accurate in sphericity to .001-inch.

In addition to all this careful final inspection, as well as the previous inter-department inspection, the laboratories check the physical properties of each lot in a super-inspection which finally determines whether the finished lot may be released for shipment.



Location of Double-Annular and Thrust Ball Bearings in Front Wheel Axle Spindle.

partments work together and the metallurgical department knows exactly what kind of steel is being purchased and the contents of the alloy.

Manufacture of Ball Bearings.

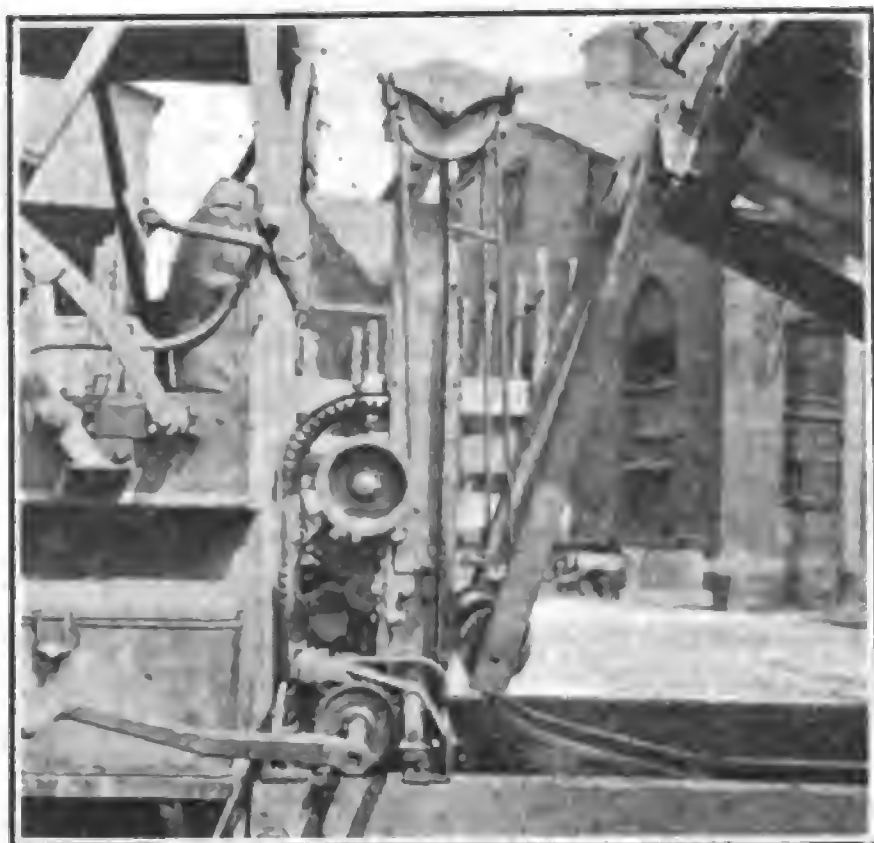
Balls exceeding $\frac{5}{8}$ of an inch in diameter and under are manufactured from coiled wire by what is known as the cold-heading process. This operation takes place in machines known as single-blow solid die headers, which automatically cut the steel and, by striking it a blow with a die-faced hammer, give it a spherical shape.

The result of both of these operations makes the balls more or less spherical in shape, and they then are known as

Up-To-Date Types of Hoists

Hand-Operated Units Interest Owners of Trucks
Up to and Including Two Tons—Larger Size
Trucks Use Hoist Actuated by Power Take-Off
of Engine Transmission

MANY truck owners do not wish to spend the money for a hydraulic hoist when purchasing truck equipment, and as there are a large number of manufacturers making power hoists of different types, the intending



Kilbourne & Jacobs Hand Hoist Operates on Double-Reduction Principle.

truck purchaser has an opportunity of choosing what will be best suited to his needs and pocketbook.

Trucks of 1½ to two tons' capacity are often operated by hand hoists and as a usual rule satisfactory results are obtained by their use. However, their field is limited and above two tons' capacity it is good judgment to use a power-operated hoist of either the mechanical or hydraulic type. There is no question but that the mechanical type costs less to buy and install than does the hydraulic and the care of the hoist after installation is so simple that the driver need have no difficulty in keeping the mechanism in perfect working condition. Carelessness will damage any type of hoist, and this should be avoided, no matter which equipment is chosen. Lubrication is the prime requisite of either type, and this item should be religiously attended to in order to receive the best results.

The Kilbourne & Jacobs Manufacturing Co., Columbus, O., manufactures power and hand-operated mechanical hoists that are adapted to end-dump body equipment of motor trucks, which combine several special features. In appearance the hoist very much resembles the hydraulic type hoist, as it occupies a vertical position in the rear of the driver's seat between the body and seat. The base of the hoist is rigidly fastened to the cross members or to the chassis frame, being bolted to the wooden sub-sills or frame. A steel track is provided, consisting of two rails, spaced equidistant, on which rollers operate, fitted to the ends of the body-lifting arms. The

body-lifting arms are hinged to the lower front corners of the dumping body, and the rolls are fastened to the lower ends of the arms, following the track as the hoisting drums tighten the cables. The steel cables are fastened to the grooved drums of the hoist at one end, pass over sheave pulleys at the top of the mast, constructed in such a manner that side movement is allowed, and pass down and are fastened to the lifting arms above the track rollers.

Double-Reduction Hand Hoist.

The Kilbourne & Jacobs hand-operated hoist works on the double-reduction gear principle. Spur gears and pinions are mounted on cross shafts with bearings mounted in an upright casting, which forms part of the mast. The power of the crank is transmitted through the spur gears to drums fitted to an extension shaft at either side, the drums winding up the steel cable and raising the body to the proper dumping angle. A pawl and ratchet on the crank handle shaft allows the body to be held in a partially elevated position, if the operator so desires. This is styled a one-man outfit and is used largely on light-weight trucks or those having a capacity up to two tons.

Provision is also made in the hoist to increase the hand leverage of the turning crank handle by the installation of a second shaft to which the handle may be fitted. This secondary shaft increases the leverage many times over that obtained from the regular shaft and spur gears.

Heavy-Duty Power Hoists.

The power hoist is driven from a sliding jaw clutch on the propeller shaft through sprockets and a chain, and is controlled by a lever easily reached from the driver's seat.

The hoist is attached to the chassis frame by means of a heavily constructed bracket which allows of quick attachment. The hoisting arms are shipped attached to rugged brackets hot rivetted to the lower front corners of the body and to the front I-beam cross member. When not in use the arms fold flat under the body, following the rails as the body is raised, till they reach the mast and the body is fully inclined. The advantage of this feature, it is claimed, is that there are no long arms projecting below the body which will hinder the operation of the truck.

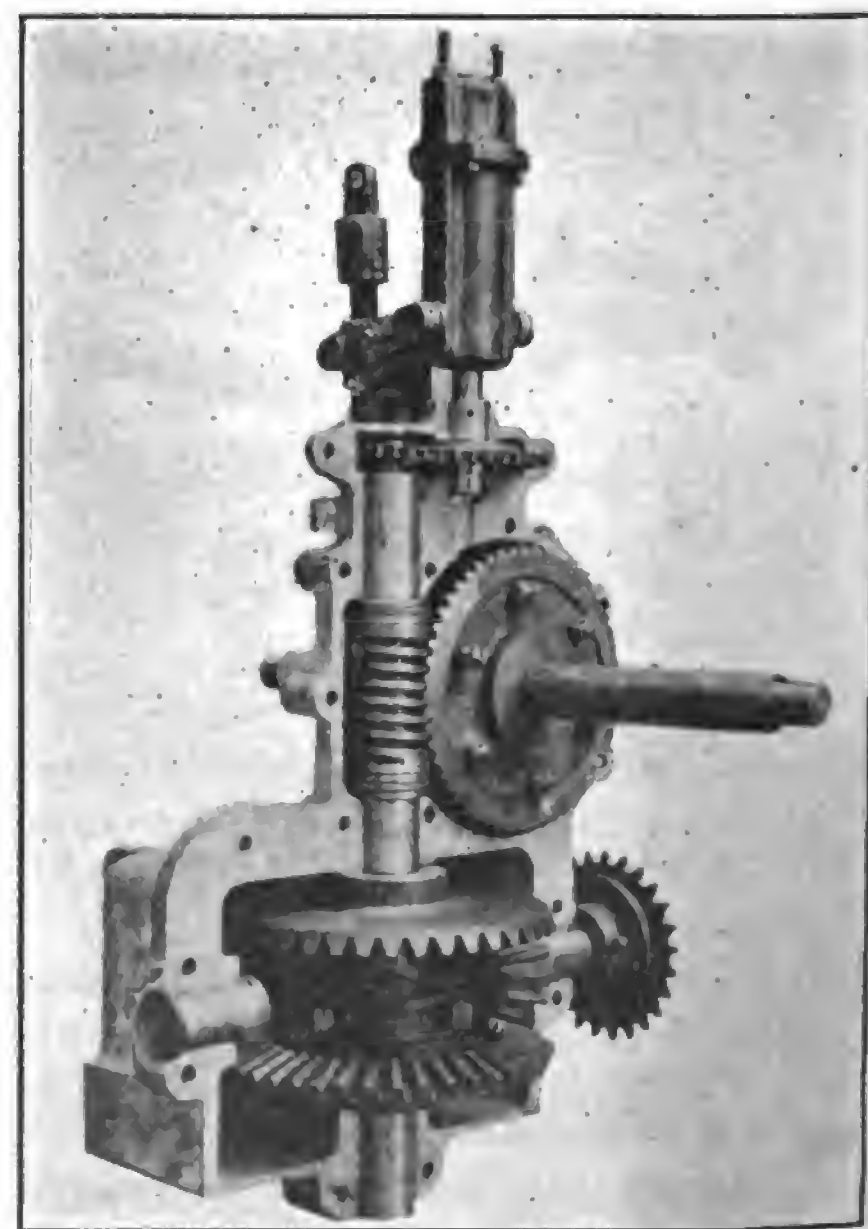
The power-hoisting mechanism automatically disengages at the total lift and also when the body has again returned to the chassis frame. It can also be stopped manually at any desired angle up to 45°, a worm lock holding the body without brakes or clutches, and can be

re-engaged for travel in either the up or down position. With this device the driver may start the body at full dump position and the hoist will lower the body and disengage with the truck in motion. The entire hoisting mechanism is housed in a bath of Non-Fluid oil, and as neither pumps nor cylinders are required for its operation, the upkeep is small.

The overall hoist height is low, as there are no rising members which require a high lift. The cable is wound on grooved drums which apply the power lift at the lower front corners of the body, first directly, then through the hoisting arms, a method which practically eliminates back-pull on the hoist.

Steel Dump Bodies.

The bodies manufactured by the company are steel, hot rivetted at the corners and reinforced along the top with wide rails. The lower side corners are rounded, preventing clogging and rust. The sides of the body are flared to give extra strength, and the front is crowned to avoid spilling the load upon the hoist or chassis, while the high end gate allows for dumping clearance. The end gate is constructed and fastened in such a man-



Hoist Operated by Power Take-Off of Transmission Is Easily Maintained and Powerful.

ner that partial dumping of the load is possible when desired, as it is manually operated from the driver's seat and allows spreading the load with the truck moving. A quadrant at the left front corner of the body, fitted with ratchet handle, controls the lever at any notch to regulate the end gate opening.

Story of a Pioneer Tire Manufacturer

Modern Methods and Careful Attention to Detail Guarantee Quality and Performance of Fabric and Cord Casings Manufactured by Hood Co., Watertown, Mass.

THIS story is interesting to the layman as well as to him who is technically educated. It shows the progress and growth of one of the greatest tire manufacturers in the United States. The illustrations give one an idea of the very efficient methods of handling the crude rubber from the time it is received until it is made into the finished tire, and text explains the the different processes in a way that can be well understood by the reader. The picture directly below shows the method by which the cord for the casing is woven together and is one of the best photographs of its kind that the writer has seen.

IN THE year ending June 30, 1917, approximately 18,000,000 automobile tires were made in the United States. In 1920 this production was almost doubled. This will give you a little idea of the remarkable growth of the tire industry.

The first six months of 1920 the tire companies were making tires at a rate that would have totalled over 50,000,000 tires for the year. This was greatly reduced, however, during the business depression the latter part of the year, so that only approximately 35,000,000 tires were actually made.

What the tire industry will do in the

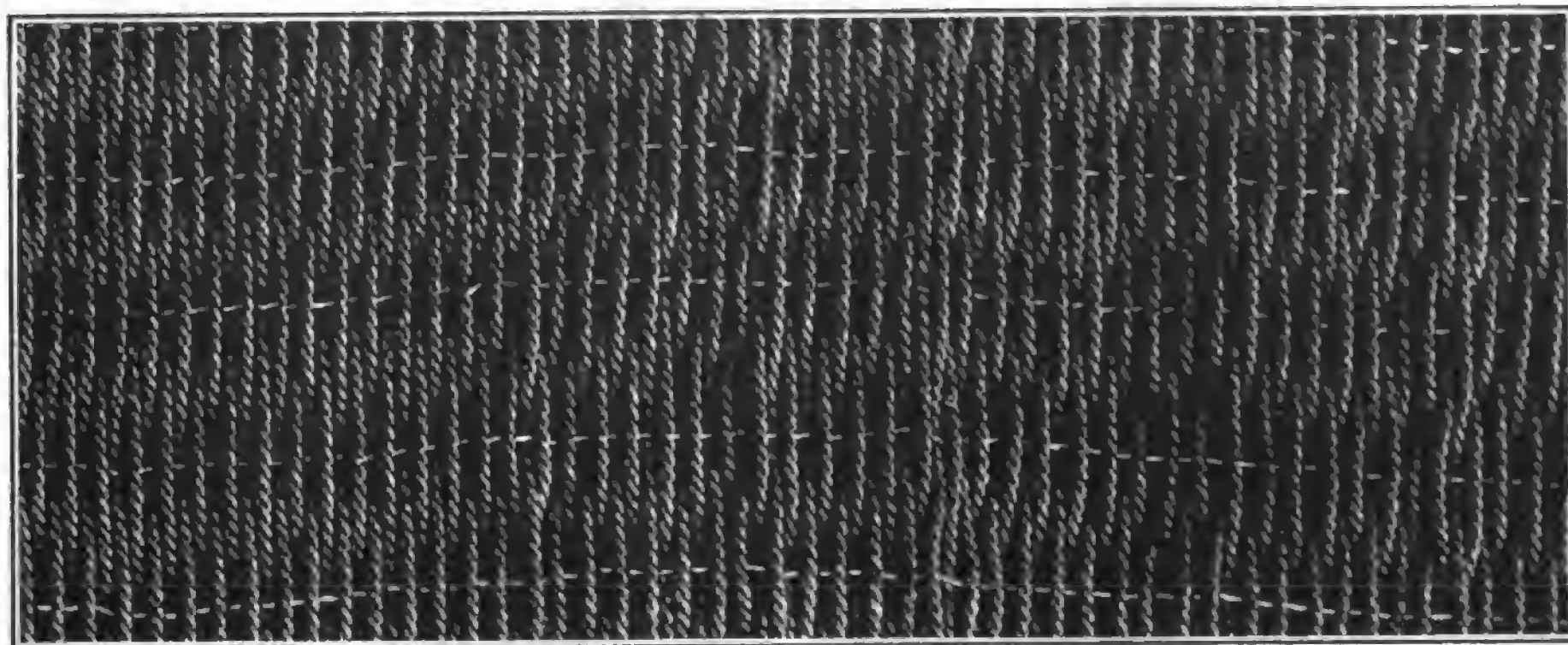
there was an automobile to every 11 persons.

This means that the United States is approaching the saturation point in so far as new purchasers are concerned. The average life of an automobile is figured at five years, and it is when re-

duced. This means that in 1923, when 1918's cars must be replaced the total production will be 1,268,000, and in 1925, when last year's cars are replaced and allowing for new purchases the production will be 2,356,000 cars and trucks.

From the General Manager of the National Automobile Chamber of Commerce we obtain the figures that there are registered in the United States 8,887,572 cars and trucks. Think what this means in the number of tires being worn out each year.

As long as these cars are run tires will be worn out and have to be replaced. If the wheels of an automobile were not properly tired the



Above, Section of Cord Used in Hood Tires. (Full Size.) Lower Left, Weighing Compounds; Lower Right, Mixing Compounds with Pure Rubber,



future depends of course entirely on the number of automobiles turned out. There was approximately one automobile to every 94 persons in the country in 1912. The number of cars has been increased every year so that in 1920

placements for more than 9,000,000 automobiles now running are considered that future production possibilities are realized. In 1918, the war year, 1,154,000 were produced and in 1920, the largest year, 2,241,000 cars and trucks were pro-

duced. This means that in 1923, when 1918's cars must be replaced the total production will be 1,268,000, and in 1925, when last year's cars are replaced and allowing for new purchases the production will be 2,356,000 cars and trucks.

proximately 45,000,000 tires without any allowance for the new cars coming through.

The tires that are being turned out today are better than ever before. They

up the yarn or No. 20 thread with 10 strands.

The cottons used to make the yarn are Sakellarides, Sea Island, Metaffi Egyptian, Long Fiber American and

is the chief reason that these tires have given increased mileage and it has been the introduction of the cord tire that has been the main factor in the reduction of the number of replacements in one year.

A few years ago there were comparatively few manufacturers of tires in the United States. But today there are approximately 200. The production of these various plants ranges from a few hundred up to 25,000 tires in a single day.

Trip Through Tire Plant.

A trip through one of the tire plants in your mind's eye might be very instructive. We would like to attempt such a trip with you through the plant of the Hood Rubber Co. of Watertown, Mass.

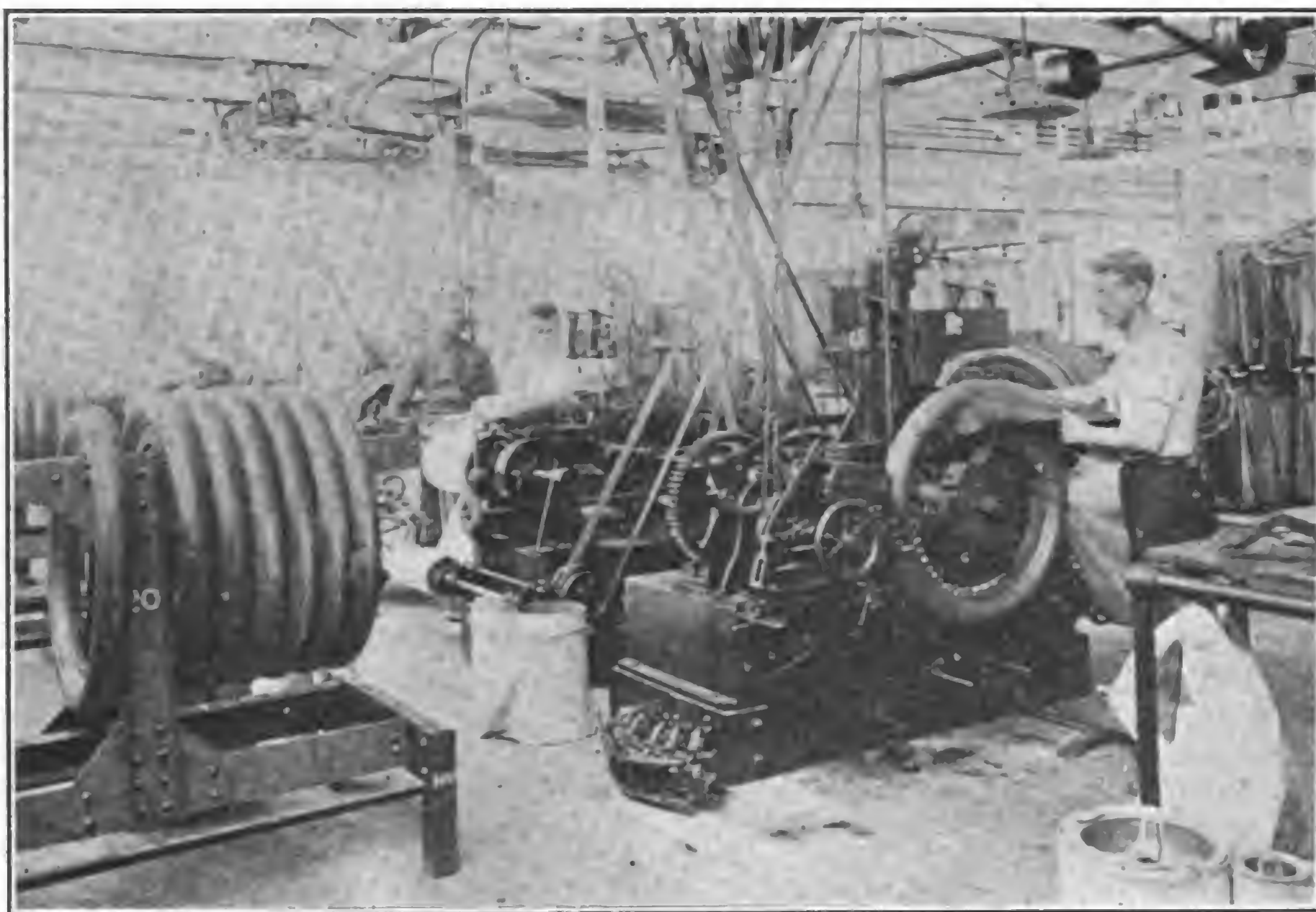
This company is not one of the largest producers of tires, but its plant is ideal in many respects. The watch word is quality first, production second. Both fabric and cord tires are produced, but to facilitate manufacture and keep up the quality they are made in separate buildings.

The fabric mill was completed in June, 1917. It was planned purposely for the construction of specific types and the workers can produce tires and tubes with exceptional economy of time and labor.

The careful selection of the materials that go to make up the tire will first draw your attention. Every lot of rubber received is carefully tested in the laboratory by chemists and graded. Only the picked lots are used in the tire construction. This is quite essential as each lot of rubber varies in its properties and to get a uniform compound chemical analysis is necessary.

Each roll of fabric is tested on a special machine for breaking strength and all rolls not coming up to requirements are rejected. This same careful inspection is observed throughout the manufacture of the tire.

The Hood fabric tire is an extra ply tire, having four plies of fabric in a three-inch tire and an additional ply for



This Fabric Tire Machine Saves Time and Does Excellent Work.

give longer mileage and much less trouble. The tire manufacturers have acquired much knowledge from past experience and applied this knowledge to the improvement of the product so that at the present time, instead of multiplying the car registration by five to arrive at their working basis, the figure three is used. They have found that the increased mileage which the tires of today deliver has reduced replacements at least two tires per car. But even then it is figured that the replacements plus tires for new cars coming through will run well over 30,000,000 tires for the year.

Scientific Methods Employed.

Tire manufacturers have applied the latest scientific methods, having physical and chemical laboratories for research and experimental work and every necessary facility for perfecting designs and manufacturing processes to obtain tires that shall have greater endurance and give more mileage.

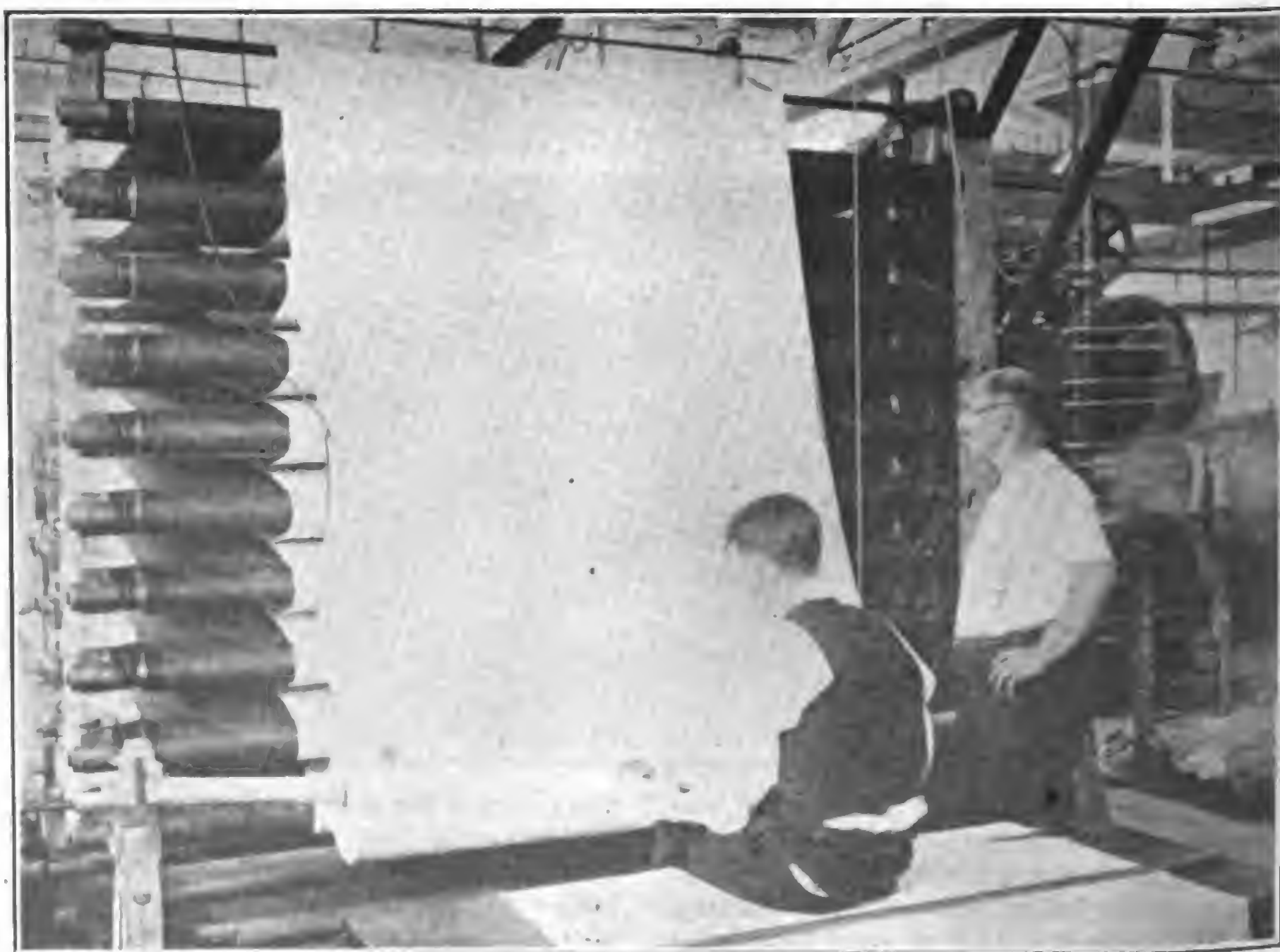
Tires have been made all sizes from three-inch diameter up to the newest and largest truck tires, which have a diameter of 12 inches. At one time there were over 30 different sizes of tires on the market. This was a hardship for the dealer in the amount of stock he had to carry and for the manufacturer in the amount of equipment necessary for their construction. The automobile and tire manufacturers have got together in the last few years and greatly reduced the number of sizes. It is hoped eventually that standard sizes will be adopted and the number of sizes will still be reduced.

Practically all tires were originally of fabric construction. Tire fabric is a duck, woven from yarn, about 22 yarns to the inch. The two kinds of yarn construction used are 23-11 and 20-10. That is, No. 23 thread with 11 strands to make

Karded American. The Sakellarides is the longest and strongest fiber cotton used in any make of tires.

In recent years the cord tire has been developed to such an extent that it has largely replaced the fabric tire on all but Ford cars. Figures for the month of March, 1921, show that 30 per cent. of the total tire production was cord and 70 per cent. fabric. But 85 per cent. of this fabric production was for Ford sizes.

There are two kinds of cord tires, cable cord and multiple cord. The cable cord is of a two-ply construction and the multiple cord is of six to eight plies. The cord tire has been made oversize. This



Showing Method of Inspecting Fabric at Plant of Hood Rubber Co.

each successive size having eight plies in a five-inch tire.

These plies are built up on sectional iron cores by specially constructed Hood machines. The carcass is then made water proof by the application of pure rubber compounds known as the side walls and top cover.

This tire is then given the first cure. It is placed in a mould, the cavity of which is the exact size of the tire and cured in a pit with live steam and under a great hydraulic pressure.

After the cure the breaker strip and tread are applied and the tire is again vulcanized to form a perfect union between them and the carcass.

The Hood cord building was completed in January of 1919. From lessons learned in the fabric plant and put into use in the construction of this building the cord tire building approaches very close to the ideal.

The building is of concrete construction. The side walls are mainly steel sash so that the interior is exceptionally well lighted. The men work on three eight-hour shifts and to provide 24 hours of daylight the Cooper Hewitt electric lighting system has been installed. By the means of a bubbler system cooled drinking water is conveyed to all parts of the plant.

Quality Before Quantity the Watch Word.

Quality before quantity is still the watch word. The fact that quality cannot be obtained unless the employees are working in pleasant surroundings has led the Hood company to erect this ideal plant.

The same careful selection of materials is observed in the manufacture of cord tires. The mixing of the compounds, the calendering of the fabric stock is done under rigid inspection. Only pure rubber compounds are used and the fabric is made from Sakellarides cotton.

The Hood cord is a multiple ply cord tire. The construction of its fabric is only of warp yarns, the yarn being made up of a special twisted construction and the warp yarns held together with a very light filler thread or pic every $\frac{5}{8}$ inch to $\frac{3}{4}$ inch to prevent separation of the cords while the fabric is put through manufacturing processes.

This process consists of a solutioning bath of rubber cement, after which it is



Method of Applying Top Cover and Side Walls to Fabric Tires.

dried and a coat of rubber pressed on both sides, on a calender, similar to that used for frictioning fabric for fabric tires.

A glance at one of the individual strands or cords which go to make up cord fabric would hardly impress the average "looker on" as being anything more than an ordinary piece of cord string. With no thought that this single cord, so insignificant in its appearance, has years of thought and experiment behind it. Each and every cord is composed of three lesser cords, which cords are in turn composed of five separate strands of yarn, and each individual yarn being made of the finest material obtainable, namely, the longest staple fiber Sakellarides cotton.

The tensile strength of one inch of dry, unrubberized cord fabric (26 cords to the inch) is 481 pounds. After an application of live plastic rubber this strength is appreciably increased.

After the calendering the fabric is cut on the bias by a cutting machine. This is a much slower process than in the fabric tire due to the nature of the fabric itself, which has to be handled very carefully to prevent separation of the cords.

The cord tire is made by hand

throughout. The assembling department assembles each component part in books in the exact order they will be used by the maker in construction.

The plies are cut to length and joined together by a butt end splice. This eliminates all ridges at the splices. The tread is weighed per schedule laid out so that every tire will be uniform.

These books go to the maker so that he has at his right hand all the component parts and no time is wasted in manufacture. He takes a sectional iron core and builds the tire from the inside ply to the tread.

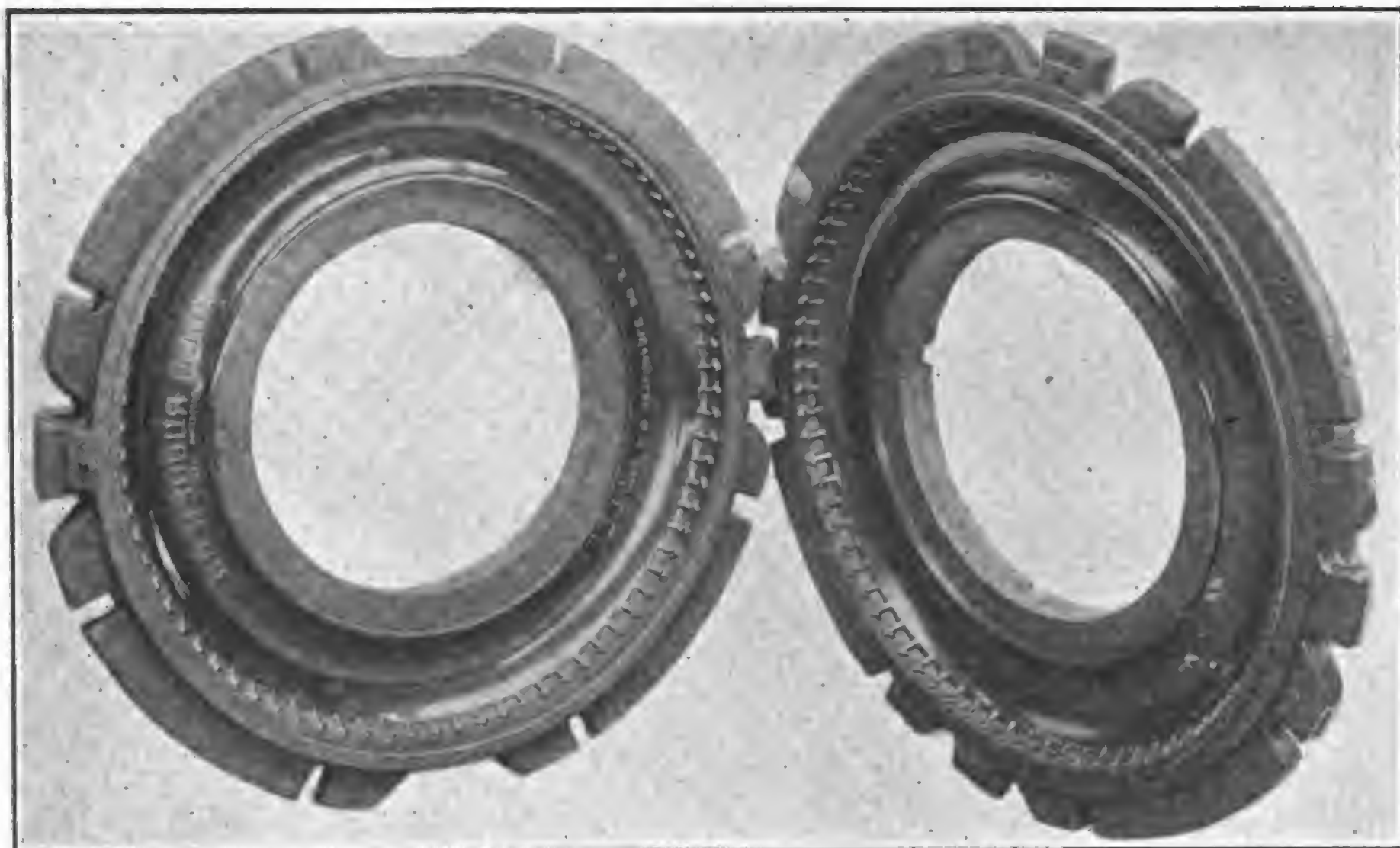
How Hood Cords Are Cured.

The Hood cord tire is cured in a single cure. The sectional iron core is first removed and an air bag substituted. Bull rings, to shape the bead, are then applied and the tire is then placed in a mould. This mould is in two sections and is very accurately machined so that the tire just fits in the cavity. The air bag is then blown up to a tremendous pressure. This internal pressure, which is further increased by the air expanding under the heat of vulcanization, expands the tire against the mould and stretches the cords of the carcass into the natural running position.

After vulcanization the tire goes to the



Left, Frictioning Tire Fabrics. Right Shows Bias Cutter Cutting Fabric After It Has Been Coated with Rubber and Has Gone Through Frictioning Process.



Showing Metal Mould in Which Tires Are Finished by Vulcanizing.

fittings installed and the ends spliced by an acid process.

In still another building of the Hood plant the manufacture of solid tires is carried on. These tires are made in three styles, European or a half-round section, BBB type or a high profile tire with straight sides and a new cushion non-skid type.

All styles are built on a steel base, which is identical in each case. The steel base has a series of grooves, which are filled with hard rubber stock and a band of hard rubber applied over these. The tread stock is run out of a tubing machine the exact size and shape of the tire.

The tire is then placed in a sectional mould the halves of which are held together under a hydraulic pressure of 1500 tons, and cured in a vulcanizer in live steam at 290 degrees. Under this tremendous pressure the tire is formed into one solid unit. The resiliency of these tires depends on the compound and the amount of rubber stock.

The accompanying illustrations were all taken in the Hood Rubber plant at Watertown, Mass. They show the tires in all stages of production and give some idea of the vast amount of equipment necessary to make a high grade line of automobile tires.

inspection department for final inspection and finishing. It is then ready for shipment.

The inner tubes are made in a separate department from the tires. The rubber stock is calendered to a specified thickness and wide enough to be wound three full turns around a steel tube with reinforcements for valve bases. The

tube is then covered with a jacket of thin cloth applied lengthwise, and the whole is wound spirally with tape, the windings overlapping. The tube is then placed in a vulcanizer and heated with live steam, which consolidates the rubber sheets. After removal from the vulcanizer the rubber tubes are removed, measured and cut to length, the valve and

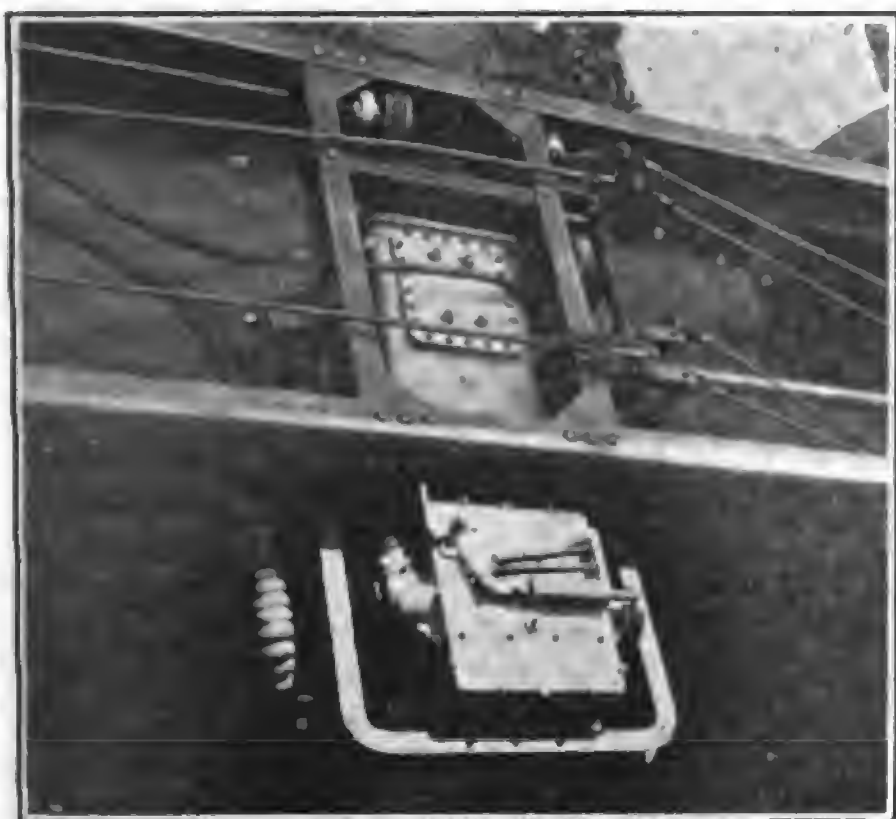


Center, First Aid Room at Hood Factory; Upper Left, Section of Vulcanizing Room; Lower Left, Final Inspection Department; Upper Right, Placing Cord Tire in Mould Preparatory to Vulcanizing; Lower Right, Section of Shipping Room.

New Steam Driven Truck Embodies Scott-Newcomb Automatic Steam System, Claimed to Be First Steam Truck Produced Commercially

STANDARD Steam Corporation, 4399 Chouteau avenue, St. Louis, Mo., announces that production plans are now under way which will allow the company to turn out about 2000 vehicles during the first year, and it expects to make initial deliveries in June, 1922. While not definitely determined on the price, it is expected that this model will sell around \$3500, fitted with electric lights and the equivalent of a self-starter on a gasoline driven truck.

Unusual interest centers around this



Engine Is Hung Crosswise of Chassis Amidship in Horizontal Position—Propeller Shaft, Direct Driven from Engine, Transmits Power to Worm and Worm Gear of Axle.

steam truck, since this will be the first commercial vehicle using steam power to be manufactured in this country, as far as is known. The many advantages of steam power are too well known to necessitate any detailed account at this time.

The truck will be made first in a two $2\frac{1}{2}$ -ton size. In demonstrations and tests, it is said, this truck has shown a saving in operating costs over a gasoline-propelled vehicle, in addition to its advantage of maximum torque at slow speeds, quick acceleration, and other improvements.

The illustration shows the two-ton job fitted with pneumatic tires which can maintain speeds up to 30 miles an hour and has easily done 35 in trials. No clutch or gear box is used, as the engine is directly connected through a propeller shaft to the worm drive Timken rear axle, which has a gear reduction or final drive of $5\frac{1}{2}$ to 1. It is stated that the power plant will develop 40 horsepower and is capable of taking its full load up any grade on which the wheels can get traction.

It is claimed that steam can be raised in one-half minute by simply turning a switch. Using kerosene for fuel, the designers have obtained from six to eight miles to a gallon; this has been selling at retail in St. Louis for 10.2 cents per gallon. On a gallon of lubricating oil

600 miles has been obtained, and on a 30-gallon tank of water 900 miles has been run with full load in summer weather over St. Louis country roads, which include several 10 per cent. grades.

Improvements Possible, the Designer Claims.

Further development of Standard Steam truck design is possible, the designer claims, as it is possible to use a disengaging clutch which will greatly increase fuel and water mileage. There is also in process of development a system by means of which from 18-20 miles per gallon of kerosene or fuel oil may be obtained. The engineers of the company are at present experimenting to work this out in a practical way. Because of the elimination of the clutch and gear box, the absence of valves which need grinding frequently, carbon to be removed and the absence of unburned fuel in the crank case, etc., the upkeep and repair bills are stated as being lower than a gasoline-propelled truck of a similar capacity. Using the reverse as an emergency brake eliminates the necessity of a pneumatic brake as has been proposed for high-speed, gasoline-driven vehicles.

In getting out of mud holes and other tight places the steam truck is claimed to show wonderful performance on account of its high torque at slow speeds, which prevents the rear wheels from digging in. With the $2\frac{1}{2}$ -ton truck, $3\frac{1}{2}$ tons have been hauled up a 15 per cent. grade, without trouble.

The Scott-Newcomb steam system is well known among engineers and the trade is fairly well acquainted with its principles. It is sufficient to note that the system has several innovations and improvements in the application of steam power to vehicles. The engine is mounted crosswise on the truck frame amid-

ship, in about the location of the usual gear set of the gasoline-driven truck. No gear set is used as the engine is connected directly to the worm of the Timken axle and is driven through a propeller shaft.

The eccentric driven rod which operates the valves is constructed to be shifted axially for controlling the cut-off and reversing the engine when backing the truck. A pedal operated by the left foot, similar to the conventional clutch pedal, is used to shift the cam. The engine has



Boiler Is of Flash Type, Located Under Hood and Claim Is Made That Steam Can Be Raised in One-Half Minute by Simply Turning Switch.

two double-acting cylinders, four-inch bore by five-inch stroke and gives the same number of impulses as does an eight-cylinder internal combustion engine with added flexibility. The crank shaft is of one-piece construction, having plain connecting rod bearings, and two ball bearings for the main journals. The engine fly wheel serves as a pulley to drive the generator for lighting and heating the boiler when raising steam, and also affords an arm to which is attached the thermoid coupling. The forward end of the generator shaft serves as a drive for the radiator fan.



Lines of Two-Ton Job Closely Resemble Gasoline Engine-Driven Types and It Is Claimed to Be Unusually Powerful.

Moore High Lift Coal Body Endorsed by Users

*Specially Designed for Easy Handling of Coal
—Hoisting Method Is Unique, Allowing 11-Foot
Elevation of Load Which Discharges by Gravity*

THE retail coal dealers throughout the country who deliver the bulk of their coal in commercial vehicles, find that often they are called upon to deliver the load into bins difficult to reach. Many coal openings in the side walks or windows in the side of a house

lined on the inside, both sides and floor, with No. 16 and No. 14 gauge steel sheets. In addition to the spout the entire rear gate can be swung open if desired, as when hauling other materials other than coal. The bodies are all equipped with boards dividing them into one-ton com-

degree pitch, permitting the coal to slide out freely.

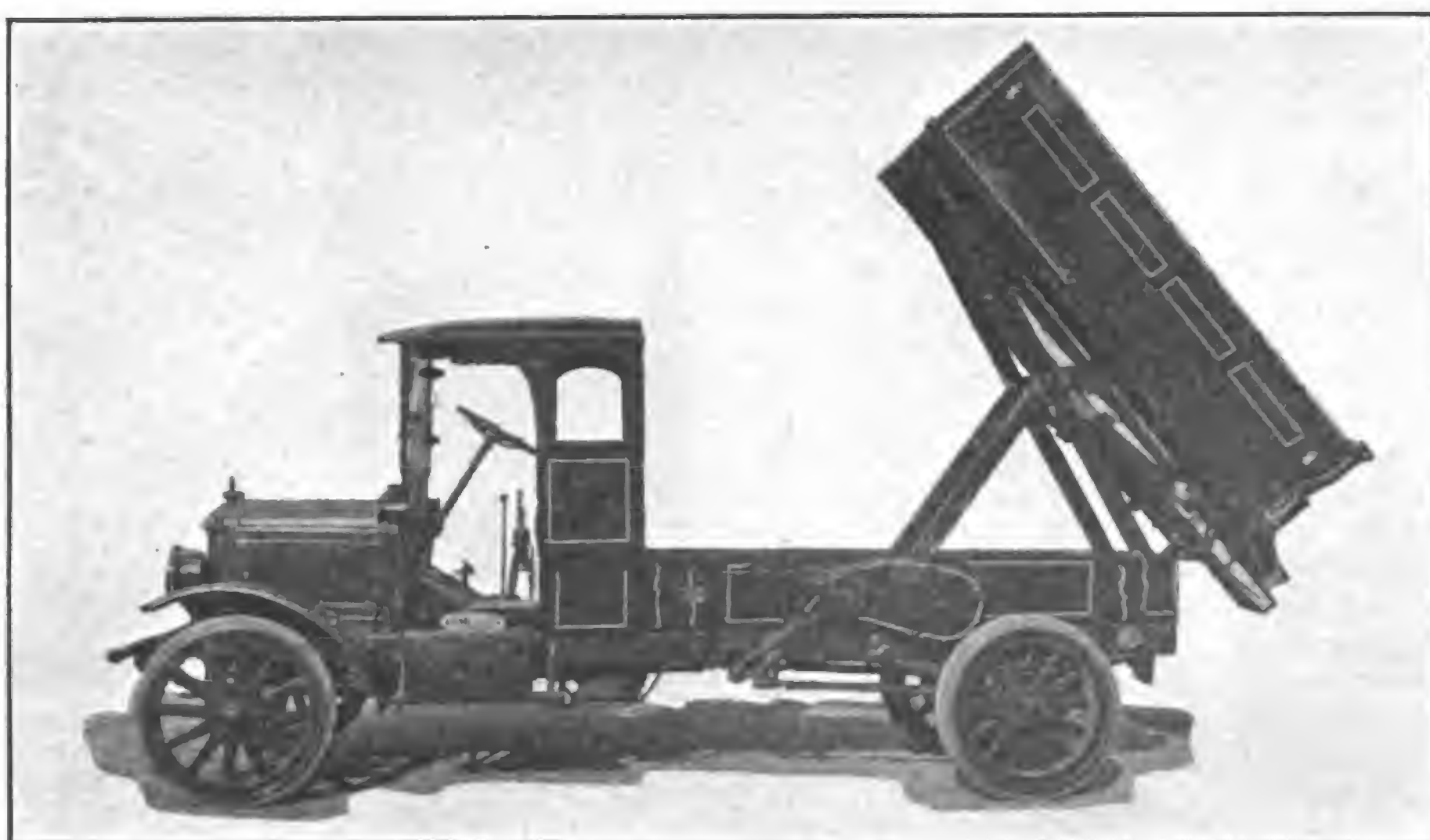
The hoisting mechanism also has an attachment which permits only the front end of the body to be elevated, the rear end resting on the lower sill, similar to a contractor's end-dump body. When the body is raised in this position it has a 60-degree pitch, which is preferable when hauling soft coal, bagged coal, sand, stones, gravel, etc.

The combination of end dump and high lift in the Moore steel or wood bodies offers retail coal dealers a body containing new and up-to-date features which will successfully handle coal in narrow streets, chute it across side walks, load it into railroad cars, and in many ways solve the problems of the retailer, wholesaler and mine owner.

Hoisting Mechanism Unusually Well Made.

The high-grade materials used in the construction of the hoisting mechanism, gears, etc., are the best chrome-nickel steel. All gears are cut-tooth type, accurately cut and finished to withstand heavy duty service and give long life. The shaft bearings are of large size, heavily constructed and bushed with brass. The lifting arms are forged from the best quality of steel, as are all castings used in the lift assembly.

Mr. Moore states that his best recommendation for the bodies built in the past is the large number of repeat orders which he has been receiving from the largest truck manufacturers and dealers in the country; in fact, throughout the past business depression his plant has been in constant and regular operation.



Moore High-Lift Coal Body and Power Hoist Installed on Armleder 2½-Ton Motor Truck.

cellar require that the coal be carried by hand from the truck to the bin opening, or chuted across the side walk. As this method of delivery costs the dealer additional money and requires several additional men to handle the coal, it is desirable to find some method of eliminating the additional expense.

Body builders have also studied this problem and many styles and types of bodies are on the market which coal dealers may purchase, these bodies being fitted with methods of hoisting, either power or hand operated, which enable the truck driver to raise the load and body to any desired angle, and to dump the load in such a manner that it may be chuted to any desired point of delivery.

Edwin A. Moore, Reading, Pa., specializes in a coal dumping body which solves the delivery problems of retail coal dealers in a unique manner. This body and hoist are built in suitable sizes for one, two, three and four-ton chassis, is complete with power lift hoist and is adapted to all makes of trucks within these capacities.

The bodies are constructed of either all steel or wood, steel lined throughout. The steel bodies are very rigidly made and are designed for hard usage. The sides are made of 3/16-inch steel plates and the floor is covered with 1/4-inch steel plates.

The wood bodies are constructed from the best quality of well-seasoned oak and

partments and are readily removable when bulk loads are hauled.

Power Hoist Easily Raises Load.

As the power hoist raises the body to its highest elevation, the distance measured from the ground is 11 feet to the floor of the body in front and 7½ feet from the ground to floor of body in the rear. In this position the body has a 35-



End View of Moore High-Lift Coal Body Mounted on Autocar Two-Ton Chassis, Showing Height at Which Load Is Delivered.

Taco Myers Mower Attachment for Fordson

New Appliance Developed in West Approved by Dealers—Claimed to Effect Great Saving of Time and Labor

TRACTOR APPLIANCE CO., New Holstein, Wis., announces that it is now in production on a new Fordson mowing attachment which bears the approval of Ford Motor Co. engineers. This attachment was originally developed in the West by the E. A. Mitchel Tractor Co., approved Fordson implement dealer, which has had considerable experience in attachments for the Fordson, this experience leading eventually to the development of the Taco Myers mower attachment.

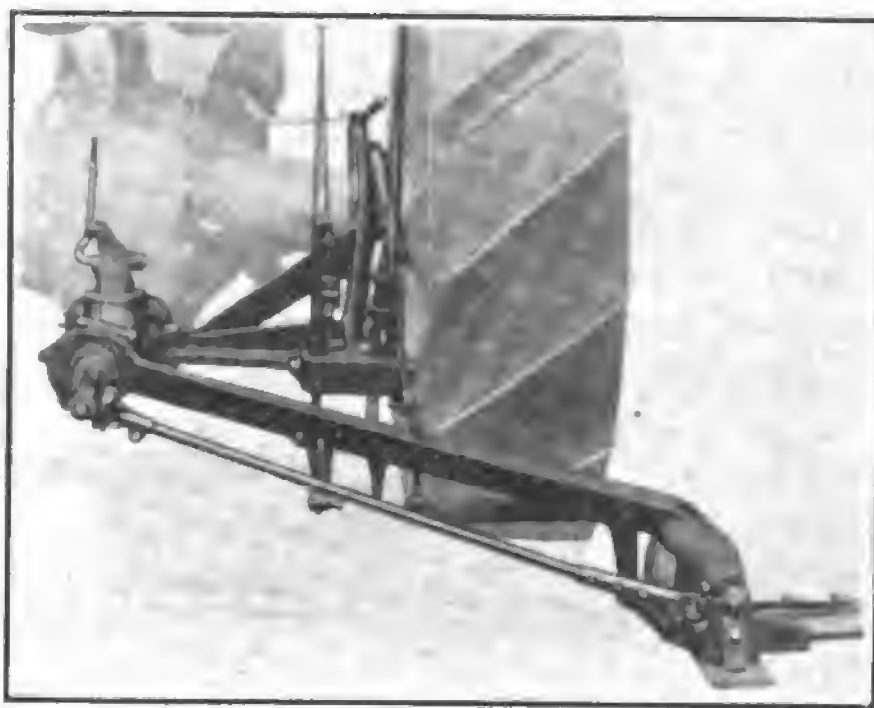
Having tried out the various models offered for sale with the Fordson tractor and finding them practical for general field use, it decided to develop a satisfactory mower.

Actual experience in the field taught the correct location for the mower on the Fordson tractor was at the worm housing with the bar opposite the operator's seat. A sample machine was placed in operation and given a thorough trial for over a year in the field under severe conditions encountered in western territory, on hill sides, climbing ditches and levees, in fact every conceivable place a farmer would want to operate a mower. It was found that a mower needed as much or more clearance than the tractor when passing over levees, ditches and hill sides, so frequently encountered when cutting hay and alfalfa. One by one every difficulty in field operation was met and overcome in the Taco Myers mower attachment.

Construction of Fordson Mower Attachment.

The Taco Myers mower attachment for the Fordson tractor is a complete unit that can be attached or detached from the tractor, in much the same manner as

a plow or disc harrow, by simply loosening four cap screws and one wing nut. It is attached to the draw bar of the tractor, is driven from the worm of the tractor through a single pair of gears and is claimed not to interfere in any manner with Fordson engineering principles. The drive shaft housing is a new design and is unusually rigid, while the 39-inch pitman supplying power to the sickle bar reduces vibration to a minimum.



Mowing Attachment May Be Attached or Detached in a Few Minutes Time.

The cutter bar being located opposite the driver gives the operator an opportunity to see stones or stumps before the cutter bar strikes them. This position places the cutter bar in full view of the operator at all times without his turning in his seat. The mower attachment is given more clearance than the tractor, which is an essential feature where the land is rocky and on irrigated tracts. The speed of the sickle is always correct regardless of the speed of the tractor, whether travelling in low or second

speed. The location of the sickle bar permits turning a square corner when turning in the field. The pitman drive shaft is short and operates on heavy Hyatt roller bearings and is oil fed from the worm housing, doing away with the necessity of grease cups and universal joints. The drag bar and arch are of one-piece construction, which prevents sagging of the cutter bar.

A feature which will prove of interest to power farmers using the Taco Myers mower attachment is that the attachment may be installed in from 15 to 20 minutes and it has a cutting capacity of from one to 2½ acres an hour. The weight of the mower attachment ready to install is given as 250 pounds.

HOW SHELLAC IS MADE.

Shellac is the product of a tiny insect which infests certain trees in the East Indies.

The term lac is the same as the Hindu numeral lac, a hundred thousand, and indicates the countless myriads of insects which make their appearance each spring on the young, tender shoots of the infested trees. These feed upon the sap in the bark and, after passing it through their bodies, exude it in the form of a crimson-colored resin, which in course of time hardens into a tiny, semi-transparent cocoon or shell.

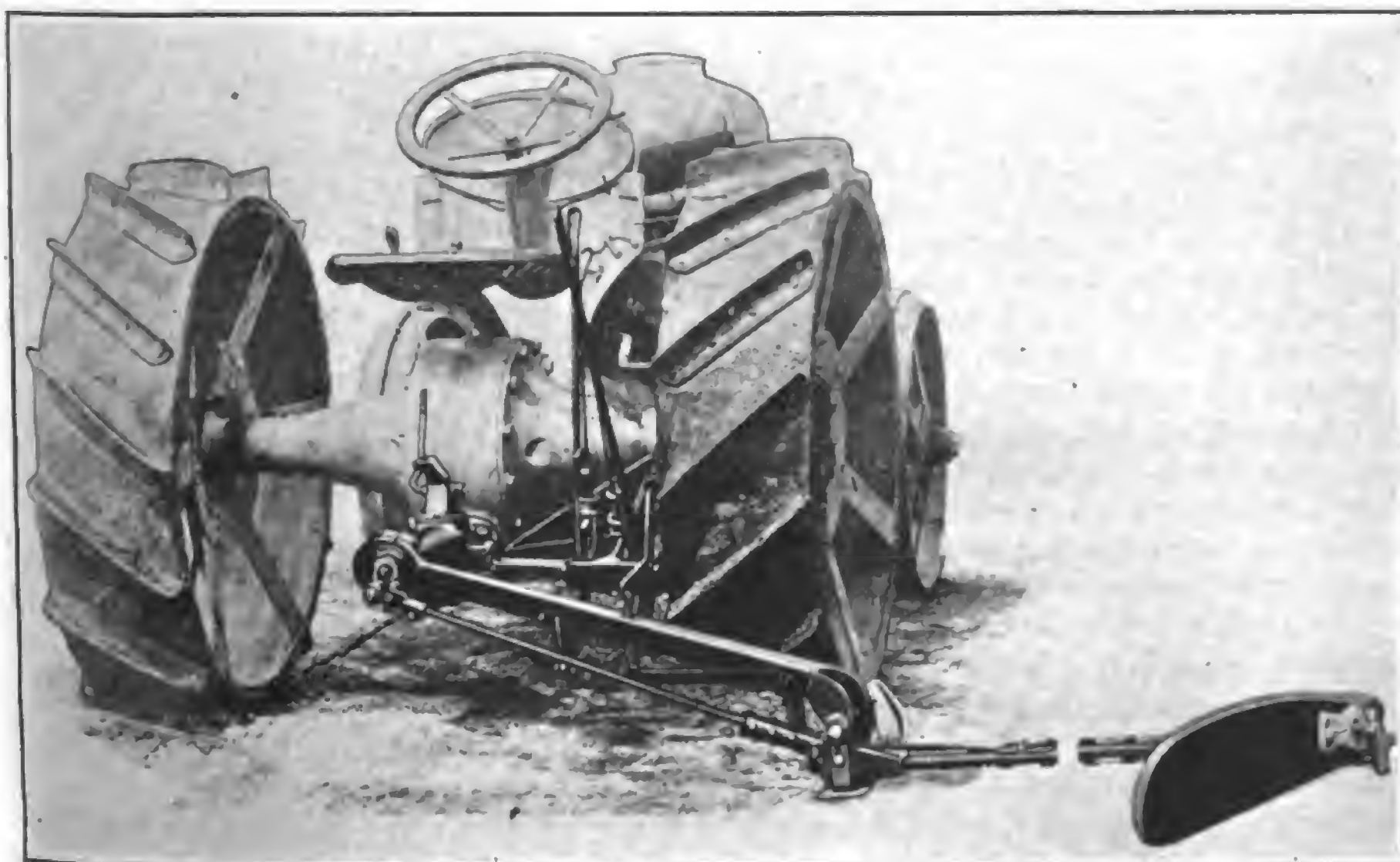
It is these cocoons which, after being melted in boiling water and poured out on a cold surface, constitute the shellac of commerce.

Shellac has many uses. Sealing wax is practically all shellac. It is the principal ingredient in most varnishes. Hat manufacturers cannot make hats without it, a shellac solution being essential for the stiffening process. Photographers find it absolutely necessary in their business, a similar solution entering into the composition of all films, while it is, of course, the main essential in all kinds of lacquer work. In fact, there is hardly any substance that is so generally used in so many widely different trades and manufactures.

LARRABEE-DEYO CO. CUTS PRICE.

The Larrabee-Deyo Motor Truck Co., Inc., of Binghamton, N. Y., announces reductions of \$200 and \$300 on its models. The 2½-ton is cut from \$3400 to \$3200, the 3½-ton from \$4200 to \$4000, and the five-ton from \$5100 to \$4800.

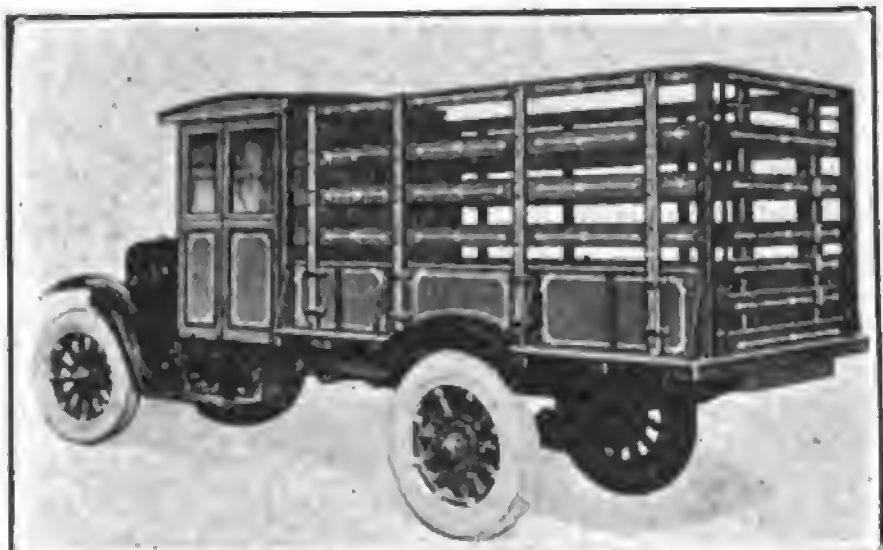
F. E. Kaiser has been placed in charge of the replacement division of the Zenith Carburetor Co., Detroit, Mich. This brings under his management over 700 Zenith service stations in the United States and Canada.



Taco-Myers Mowing Attachment Driven from Worm Gear of Fordson—Mower Cutter Bar Thrown in or Out of Gear by Simple Twist of Operator's Wrist.

Giant General Utility Bodies Made in All Sizes

The Giant Manufacturing Co., 228-238 Fourth street, Council Bluffs, Ia., manufactures special bodies for the Ford ton truck, including a General Utility three-in-one farm and stock truck body and truck cab and also a school bus body of the glass enclosed type, which is adapted



Farm and Stock Body Designed for Ford One-Ton Truck Offers Many Special Features.

for transporting scholars to and from consolidated schools.

Giant General Purpose three-in-one farm bodies are made in all sizes and for all makes of trucks as well as the Ford, are unusually sturdy, are dependable and adaptable to any number of uses on the farm.

Giant cabs are fitted with $\frac{3}{8}$ -inch plate glass and the windshield is designed in such a manner that an unobstructed view of the road is given at all times. Bodies and cabs are carried in stock for trucks of $\frac{3}{4}$, one, $1\frac{1}{2}$ and two-ton capacities, while special sizes can be made to order to suit individual needs.

Giant school bus bodies are made to fit any make of truck chassis as well as the Ford. Front door entrance is provided only, which insures safety for the



School and Bus Body for Ford Used Successfully by Consolidated Schools to Convey Children to and from Rural Districts.

scholars and the bus will comfortably seat 20 children. The seats run lengthwise of the body, are $9\frac{1}{2}$ feet long and 16 inches wide, fitted with back cushions 15 inches high and stuffed with hair. All cushions are covered with high-grade imitation leather and trimmed smooth, making them easy to clean and sanitary. The seats are fastened to the body, which prevents them from being removed and the bus used for other purposes than that for which it was designed.

REMOVING BIG PNEUMATIC TIRES A ONE-MAN JOB.

The apparent ease with which a thoroughly experienced driver can dismount and apply without assistance big pneumatic truck tires is evidence that there is a knack to it that is worth the attention of those who own or operate trucks.

In the following paragraphs the United States Tire Co. points out briefly how handling these tires can be made a one-man job.

To dismount the tire and rim from the wheel, jack up the wheel until the tire freely clears the ground, loosen the tire bolts, and then the rim by shock and turn the wheel so that the sector containing the valve is near the ground. With both hands grasp the tire and rim at points just below the level of the hub and quickly lift and pull the rim away from the top of the wheel. At the same time watch the valve to make sure that it does not bind in the felloe when the rim slides off the felloe band.

If properly performed this method of dismounting the tire and rim from the wheel requires very little lifting, and causes no damage to the valve or the tube at the valve base.

To detach the tire from the rim, lay the tire on level ground, locking ring side up, remove the valve plunger to complete deflation, and push back the valve stem inside the rim. Remove locking and side rings, loosen flap all around and, standing inside of the rim, lift the tire straight up off the rim.

When the tire is ready for replacement on the rim, reverse the operation of detaching the tire from the rim with tube flap in place and valve stem pushed back flush with base of flap, drop the tire carefully over the rim, taking care that the base of valve stem is directly opposite the rim valve hole. Step down the tire on the rim all around by treading on the bead, apply side and locking rings, draw out valve stem to proper position and inflate.

Finally, in applying the rim and tire to the wheel, engage the valve stem in the felloe at a point level with the hub, push the rim firmly against the felloe and slowly turn the tire, rim and wheel until the valve is at the highest possible point. The rim will drop into place on the felloe except at the bottom, where it can be pushed on by the foot.

This knack of first engaging the valve, then turning the tire and rim on the wheel eliminates all direct lifting, and makes the applying of large size pneumatic truck tires a one man job.

SIMPLE FORMULA FOR CLEANING SPARK PLUGS.

Dissolve two tablespoonfuls of lye in one quart of water and keep the spark plugs in the solution for 24 hours. Then remove them and they will be perfectly clean and ready for use.

FORD'S RAIL REDUCTION TOO RAPID, RULES I. C. C.

WASHINGTON, Aug. 19.—Freight rate reductions on Henry Ford's Toledo, Detroit and Ironton railroad have been made too rapidly to comply with the regulations of the Interstate Commerce Commission. His application to file a tariff reducing by 20 per cent. the rate on stone from Sibley, Mich., to Detroit, was for this reason denied by the commission. Mr. Ford put into effect a reduction on July 26 of five cents a hundred on this traffic and under the regulations 30 days must elapse before additional reductions can be made in the same traffic.

NEW REGULATIONS FOR TRUCK LIGHTS.

BOSTON, Aug. 15.—The great majority of motor trucks now operated on the highways of Massachusetts are equipped with either oil or acetylene head lights, and these will have to be decidedly modified to comply with the new law which is to go into full effect today according to highway officials. The main points of the new law to be remembered are that all motor vehicles shall be equipped with approved head light lenses or reflectors.

That bulbs of 21 candlepower, not less, not greater, shall be used.

That all reflectors shall be kept clean and free from tarnish.

That all bulbs shall be properly focussed.

Penalties for violation of these regulations are, for first offense, a fine not exceeding \$25; second, not less than \$25 and not greater than \$50; third, not less than \$50 and not greater than \$100.

Vehicles with electric lighting systems can readily conform to the new law, but it is more difficult indeed for the owners of vehicles not so equipped to meet the requirements.

It is the intention of the motor registrar to treat all classes of vehicles alike. The announcement that present head lights on commercial vehicles will be illegal under the new regulations has caused considerable activity on the part of the acetylene and oil lamp makers, as well as the Illuminating Engineers' society, the Society of Automobile Engineers and similar organizations who, at a recent meeting in New York, worked out a plan of specifications for lights that will meet the new requirements. It does not necessarily follow that trucks must be equipped with certain approved devices that will reduce the glare, and that these devices must be approved and used before Aug. 15.

In the handling of oil and acetylene lights, a different factor is encountered than is to be found in electric lights. It is not reasonable to suppose that lenses approved for electric lights can be used for acetylene lights. In fact, it is believed that none of the lenses already approved will perform the necessary functions when utilized in connection with other lighting systems, as the source and principle of lights are vastly different.

Cranes Operated by Gasoline Engine or Electric Power on Special Mountings Now Used Extensively in Construction Work with Motor Trucks

IT took a shortage of man power to fully sell American business executives on the value of the small industrial crane, but with the idea established, few will even consider a return to old methods, no matter how cheap or plentiful labor may become.

The wide application of machines of this type to many lines of industry is clearly shown daily throughout the large cities of the country, wherever building operations are under way and excavating is being done: Road excavating, handling road-building materials from the cars to trucks which convey the material to the excavation or to the mixer, and also in many other lines of work where these machines may be used.

The two types of equipment work in the closest cooperation in almost every enterprise looking toward permanent improvement of a progressive national character.

in maintenance work. These cranes likewise find extensive use in rehandling crushed stone, sand, gravel and other loose materials at railroad sidings, as well as for excavating trenches, placing heavy cast iron mains, etc., and for back filling. They are also used by leading producers of sand and gravel for digging and loading at the bank.

Material Handled Economically.

In all of these, and other services, their value is of course greatly increased wherever motor trucks can be used in connection with the cranes themselves. The value of the crane must naturally be gauged by the savings it effects over other methods and, whenever conditions permit, the use of trucks to haul away as the crane unloads, or digs, naturally reduces the cost per yard of the whole operation.

Byers cranes are furnished in two principal types: the Auto-Crane, which is a

The Byers Machine Co. was one of the pioneer builders of the smaller crane equipment and for years have been leaders in point of production. More than 700 machines of both types have been sold, and Byers customers include leading corporations in their respective lines. The organization has been in business for more than 35 years, and for years before entering the crane field was an extensive builder of hoists and other equipment used by contractors.

MANY STEEL ORDERS BOOKED AND THOUSANDS AT WORK IN PENNSYLVANIA.

PITTSBURGH, PA., Aug. 14.—Prosperity is returning to great Pittsburgh and Youngstown industrial districts. There is a noticeable revival in business in most lines. Within the last 10 days several thousand men have gone back to work, largely in the allied steel industries, several thousand more resumed work Monday and indications are that thousands more will be given employment within the next two weeks.

Invariably the men who are going back to mills and mines are doing so at reduced wages, generally 10 to 15 per cent. below what they received formerly, and in some instances at reductions of 20 per cent., but the hysteria over wage cuts and open shops has died out. Men want work and they are glad to accept steady employment even at reduced wages.

Booking Large Orders.

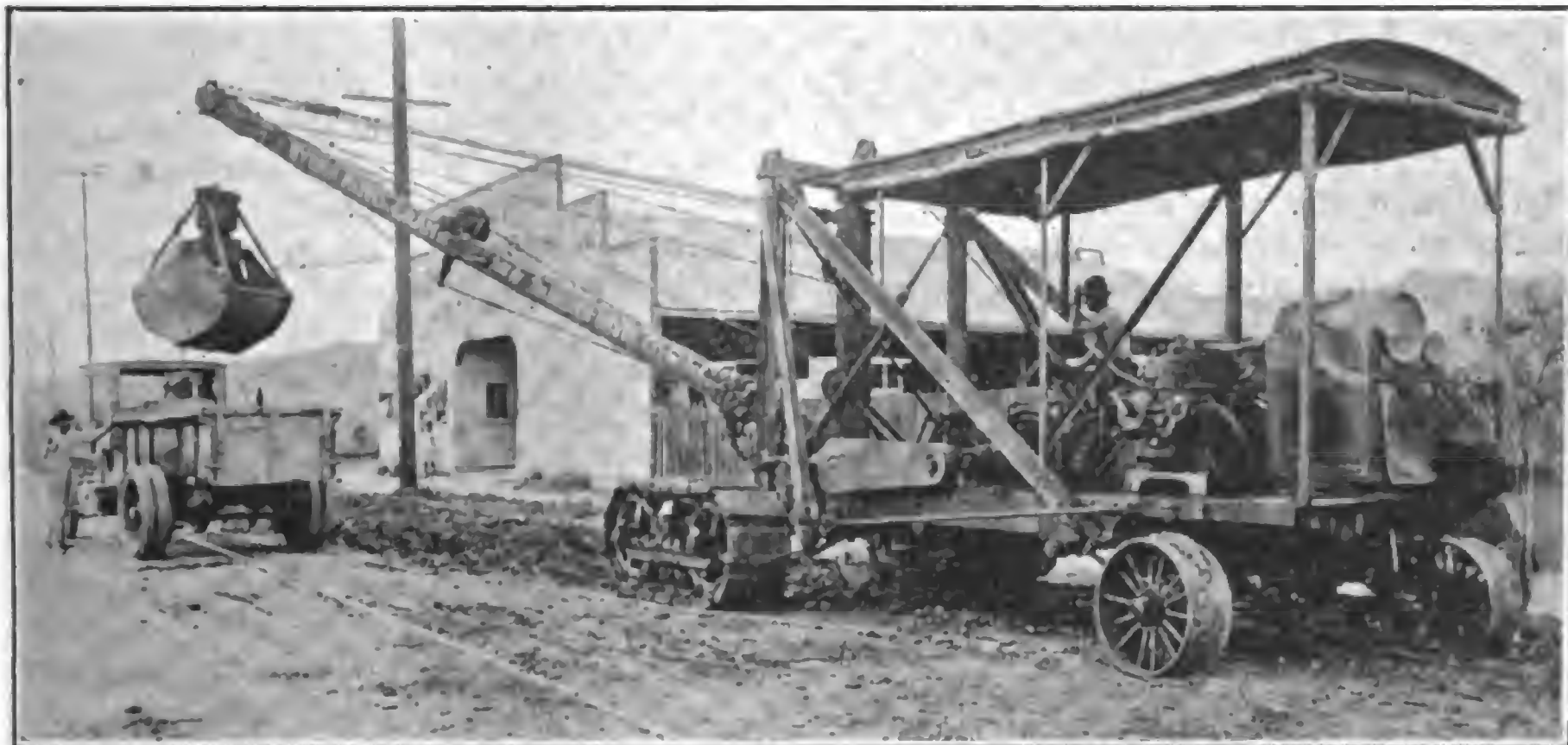
Steel plants and steel working industries are booking large orders and the whole atmosphere is more optimistic and cheerful. There is a renewal of confidence among workers and business men. The independent steel mills have reduced wages to almost pre-war scales. United States Steel is expected to get down to the independents' basis shortly.

Price cuts in steel products are expected within a week or 10 days and these prices will be at rock bottom. When buyers who have been holding back realize there will be no more cutting, a tremendous flood of big orders is anticipated and every plant will be going full tilt within 60 days, according to views of some of the biggest steel men.

Mahoning valley plants report buying is better. Some plants are working on large orders from automobile plants. Railroads are expected to come into the market for heavy tonnage of steel in September.

Grouch: One who is licked and finds a morbid pleasure in revealing his yellow streak.

Golf is becoming so democratic that many of its devotees spit on their hands when they take hold of a club.



Byers Crane, Fitted with Crawler Type Traction, Loading Road Material into Motor Truck Owned by Southwest Paving Co., Los Angeles, Cal.

Industrial operations as a class are coming more and more to depend upon machinery for their fuel handling. This is a detail of operating economy which no firm can overlook in these days of keen industrial competition. Cranes manufactured by the Byers Machine Co., Ravenna, O., equipped with clam shell bucket, unload coal from cars at the rate of 25 to 30 tons per hour, depositing it either to stock piles or directly into trucks.

In large operations, where stock piles must be built up to a height and depth beyond the reach of the standard boom, Byers cranes, it is stated, will climb the stock piles on their own power and rehandle or "wing back" the coal one or more times, as required, reversing the operation when the fuel is required for the boiler. The same crane equipment is largely used by large retail coal companies, unloading directly from cars to trucks.

Cranes are also employed in great numbers by road contractors in general service on highway and street paving and

standard half-circle machine, and the full revolving, which is built on the lines of the standard locomotive crane and performs the same service as is rendered by equipment of that type.

Both machines have been carefully designed by expert crane engineers, and the materials and shop practises are of an unusually high character. For example, more than 90 per cent. of the total weight of the pull revolving crane is of steel.

Either type of machine can be furnished for operation by steam, gasoline or electricity, as the customer may specify; also for mounting on broad-tire road wheels, crawling traction trucks, "caterpillars" under one or both ends, or standard railroad trucks of any gauge. Either machine will operate a standard $\frac{3}{4}$ -yard clam shell bucket for loose material; $\frac{1}{2}$ -yard clam shell or orange peel or drag line for excavating, and will handle up to seven tons on hook or grab work. The Auto-Crane weighs about 13 tons without bucket, and the revolving type about 17 tons.

New Acason Three-Quarter Ton Model Equipped with 32-Horsepower Engine and Worm-Driven Axle Completes Acason Line of Motor Trucks

THE Acason Motor Truck Co., 431 Brooklyn avenue, Detroit, Mich., announces its latest addition to the Acason truck line in the new three-quarter-ton model which the general sales manager states has made good from the date that it was first introduced.

This new model is capable of attaining a speed of from 30 to 40 miles an hour, has a worm-drive rear axle, 110-inch loading space back of driver's seat, an Acason four-cylinder, L-head, cast en bloc, three-point suspended engine, having a bore of 3¾ inches and stroke of five inches capable of attaining 32 horsepower at normal speed. The engine is equipped with Westinghouse starter, lighting system and generator, and is claimed to be 100 per cent. truck built throughout.

Ignition is furnished from a high-tension

wide of 3-16-inch stock, and the width 34 inches, or 202 inches overall. The springs are semi-elliptic front and rear, while the steering gear consists of an irreversible worm and nut type, fitted with an 18-inch hand wheel.

The gasoline tank is mounted under the driver's seat and has a capacity of 15 gallons, the outlet being equipped with sediment trap. The wheels are of the artillery type fitted with S. A. E. standard felloe bands.

The wheels are equipped with 34 by 5-inch non-skid cord pneumatics front and rear, which is considered ample for all overload service which the truck may be called upon to perform. The chassis is equipped with a three-man seat fitted with spring cushion and well upholstered back.

The speed control and emergency

Friday, Sept. 14, 15 and 16, were announced today by General Manager M. L. Hemmaway.

In addition to the major theme of the convention, "Bringing the Automotive Industry Back to Normal," the central key note of most of the papers and discussions will be "Business Conditions in the Automotive Industry and Prospects for the Future."

It is planned to have this topic presented and subjected to open forum discussion:

(a) From the standpoint of the raw material produced; (b) From the standpoint of the parts manufacturers and unit and equipment makers; (c) From the standpoint of the vehicle manufacturers; (d) From the standpoint of selling the automobile to the ultimate consumer market.

Leading executives in the various branches of the industry will be assigned to direct the discussions.

Another feature of the convention, which should be particularly stimulating, will be a symposium on the subject, "Selling Strategy to Bring the Automotive Industry Back to Normal." Speakers in this symposium will be sales and advertising executives of the automotive industry.

Although the convention is primarily a credit conference, the attendance will not be confined to credit and financial officials of the constituent companies. In view of the vital problems challenging the interest of the entire industry this year, it is expected that many of the sales and advertising directors and general executives of the affiliated companies will be present.

GET TRAIN LOAD ORDER FOR 100 HAYNES 55'S.

KOKOMO, IND., Aug. 11.—As a direct result of a sudden increase in sales, created by the great Pageant of Progress Exposition in Chicago, Triangle Motors, Inc., Chicago Haynes distributors, has placed a telegraphic order with the Haynes Automobile Co., Kokomo, Ind., for a solid 50-car train load of 100 Haynes 55's, the new 1922 Haynes car, which is being exhibited for the first time at the exposition on Chicago's Municipal Recreation pier.

LICENSES REACH 300,000 MARK.

MINNEAPOLIS, Aug. 15.—More than 300,000 automobiles and motor trucks are licensed in Minnesota, according to a bulletin issued recently by the secretary of state. License sales totalled 120,332 last month and 33,305 during the first five months this year. License figures for May show registrations of 46 new dealers, 302 motorcycles and 431 chauffeurs, in addition to 12,332 motor vehicle registrations.



New Acason Three-Quarter Ton Chassis—Note Clean Lines and Equipment.

sion magneto, carburetion by a Schebler carburetor and the governor is of the centrifugal, fly-ball type, built integral with the engine and entirely enclosed, and is operated direct from the timing gear set.

The engine is cooled by fan, water pump and radiator, the radiator being a built-up type with detachable core, protected by a specially designed radiator guard.

The clutch is a disc type completely enclosed in the bell housing of the engine, while the transmission gear set is of Fuller manufacture equipped with three speeds forward and one reverse, selective sliding gear type, in unit with the power plant.

Both front and rear axles are Timken, fitted with Timken tapered roller bearings, and the rear axle is fitted with Timken worm and worm gear.

The brakes consist of two sets, both internal expanding on the rear hubs, manufactured by the Timken-Detroit Axle Co.

The frame is constructed of pressed steel members, 4-16 inches for the side members, having a flange 2½ inches

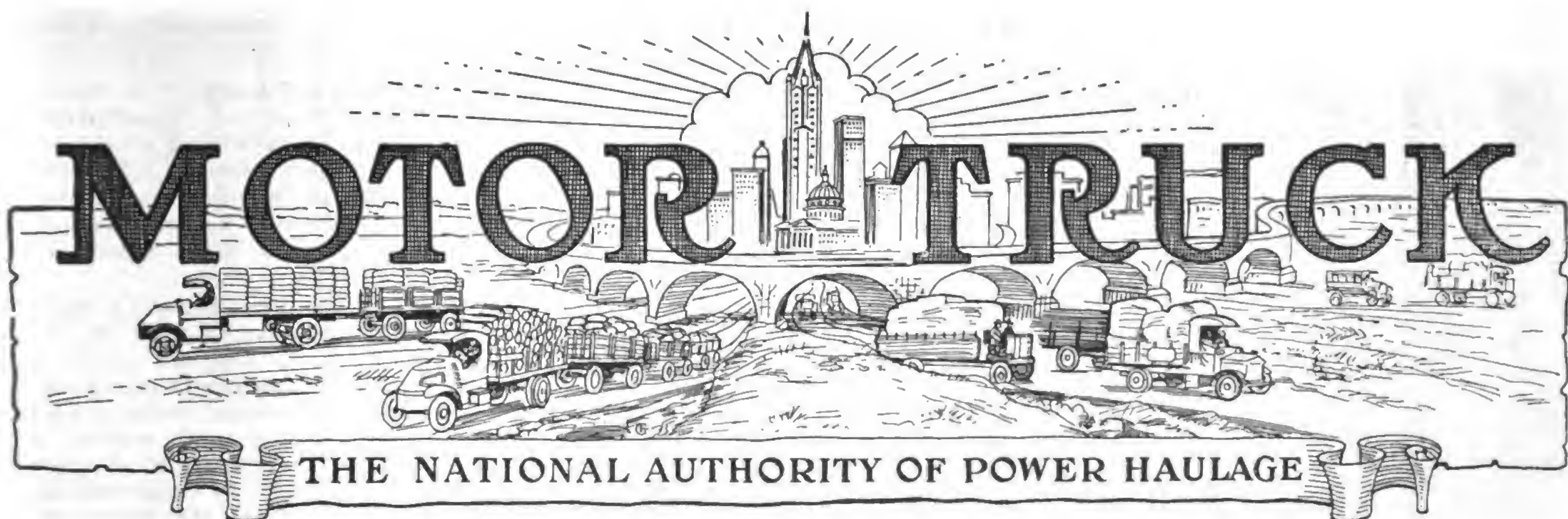
brake lever are mounted in the center of the chassis within easy reach of the driver, while an accelerator conveniently located on the floor boards allows the driver free use of the hands in steering. The hand throttle and spark control are located on a quadrant under the steering wheel convenient to the driver's hands.

The price, \$1650, includes Westinghouse starter, electric lights, generator, Willard 80-hour battery, Boyce Motometer, three oil lamps, mechanical horn, jack, oil can, and complete set of high-grade tools.

The New Acason ¾-ton Speed truck has been designed for high-speed delivery service in the suburbs and also for farmers' use in delivering produce to early market and the many other uses to which a three-quarter one-ton truck may be used.

PLAN CREDIT CONVENTION.

CHICAGO, Aug. 12.—Further plans for the "Back to Normal" convention of the Motor and Accessory Manufacturers' association to be held at the Hotel Statler, Detroit, Mich., Wednesday, Thursday and



VOL. XII. NO. 9.

PAWTUCKET, R. I.

SEPTEMBER, 1921.

How England Is Solving Problem of Rural Roads

Is Understood to Have Adopted Principles Set Forth in Following Dissertation—750,000 Motor Vehicles Pay Tax Totalling \$45,000,000

(By EDWARD JOHN STEAD, Somerset, England.)

IN ENGLAND a very great deal has been written about widths of roads for the accommodation of modern traffic, and while admitting that a large proportion of what has been suggested is doubtless very desirable, it is submitted that under prevailing conditions, and notwithstanding the desirability of widening roads as a provision for future traffic developments, the widening of rural roads to 40 feet or 60 feet is today an impracticability. It is hoped that the consideration of this paper will result in the evolution of a practicable proposition suitable for immediate adoption. To this end the author expresses the opinion that a standard width of 18 feet is sufficient for rural roads, with the exception that in certain cases of considerable mixed fast and slow traffic 27 feet should be adopted in order that there may be room for three vehicles abreast, thus permitting the fast to overtake the slow.

THE necessities of the times call for the exercise of great discrimination in the selection of roads to be given the greater width, and it is believed that the proportion of 27 foot roads would prove to be effective if roads now 14 feet to 17 feet wide could be widened to 18 feet throughout.

Bearing in mind that a practicable line of action is being sought, the selection of materials which will withstand the traffic presents very considerable difficulty, and it is obvious that water-bound macadam must still be used on many miles of roads for some years to come. It is not proposed to deal with concrete as a road material since the author is of the opinion that the high initial cost, the uncertainty of a sufficiently long life to justify such initial cost, and the fatal bar of construction in half-widths puts it out of bounds for serious consideration as part of



Bonchurch Road, Isle of Wight—The Blind Curve in the Distance Would Bother an American Truck Driver, but They Don't Mind Them Over There Where Nearly Every Rural Road Is a Succession of Hairpin Turns.

the present problem.

The improvement of road surfaces will undoubtedly be provided by the increased use of asphaltic, bituminous and tarred macadam, using wherever practicable local materials in order to cheapen the construction. Before such surfaces can be laid many roads will need strengthening and reshaping, probably additional drainage, and also the provision of some form of side support, or curbing all such necessities of course, adding to the cost.

The price of tar has reached such a figure that a greatly extended use of bitumen may be looked for, though large quantities of tar will still be required for surface treatment. Bitumen is now quoted at a lower price than tar. On such roads as traffic requirements justify its use two-coat asphalt work is probably the most suitable method, the plan being



This Road Passes Through Uffington—It Looks Substantial and Solid, but the Loads We Pile on to Our American Commercial Vehicles Would Make Short Work of It.

adopted of executing such a length annually on each selected road as financial considerations permit. On many roads this method would provide the requisite additional strength as well as supply a suitable surface.

There are differences of opinion as to the most satisfactory method of constructing bituminous macadam roads. It is submitted that the use of a previously coated material is preferable to the grouting method, as the latter is slower in execution, being to a certain extent dependent upon weather conditions, is less certain in its results, and permits more voids. Tarred macadam has the advantage that it can be laid some days after tarring, but bituminous mixtures must be laid while still hot. The lack of suitable plants for bituminous work, and the present expense of providing the same, will be a detriment to many authorities in the use of bituminous work. If it were practicable for the wealthy companies supplying bitumen to provide on loan suitable plants, with a competent man in charge for portions of a year, passing the plant on to various authorities, it is thought that a real want would be met and a difficulty disposed of. Even if such a course were desirable the contractors experienced in the work will not be able to carry out all the work of this character which will be required, and necessarily large quantities of it will have to be done directly by the road authorities. The continued use and extension of tarred material will depend to a large extent upon the price of tar, and the extent to which facilities for the increased use of bituminous macadam are provided.

The publication of the Ministry of Transport's designs for standard road signs should cause a very great improvement in the sign posting of the country roads, though there will doubtless be numerous authorities who will consider that expenditure on this work is not an urgent necessity, and it is to be expected that in many instances action will be deferred until other forms of road work have assumed a less pressing aspect.

The financial aspect of the problem under consideration must receive serious

attention, and the question of how the moderate policy outlined above is to be financed at once obtrudes itself. In many quarters it is apparent that the high water mark in taxing has been reached, and a strenuous campaign of economy is at present in full swing. If it is correct to say that the cost of road works is now two and a half times what it was in 1914 and the assumption is allowed that the amount raised by rate is double what it was in 1914, it is clear that less work would be done now than in 1914 if it were not for government assistance in respect of classified roads.

In 1913-14 an authority spent £92,000 on rural main roads. In 1920-21 the similar expenditure was £167,000. The estimates for 1921-22 are £247,000, of which £150,000 is estimated to be provided by the authority, and £97,000 by classification grants. Taking two and a half times the 1913-1914 expenditure, the result is £230,000. It is therefore evident that the sum of £17,000 is the available provision for improvements, better surfacing and to cope with the ever increasing traffic. It is submitted that such provision will not suffice. Apparently the only hope of further financial provision is to be found in an increased yield in the tax from motor vehicles, the number of which is "in-

creasing by leaps and bounds." It would be interesting to know how the additional £9,000,000 will be distributed when the number of vehicles reaches 1,500,000. Will the existing percentages contributed towards classified roads be increased to absorb it or will additional roads be classified?

The figures given above relate to main roads under a county council, and by the help of grants towards classified roads it is shown that they can barely carry on. The case of the district roads under rural district councils is much worse. It is probable that the mileage of district roads which will benefit by classification grants will be small, but the increased costs due to char-a-banc and milk-lorry traffic will be large. These increased costs if met at all must be met by rating, but if the limit in that direction has been reached then the district roads must perforce remain in poor condition for some time at least.

It is thought that the above brief statement of the rural road case will clearly indicate the necessity for forming a correct estimate of the possibilities of great improvements in that class of road in the near future.

The following conclusions are suggested for adoption as a line of action in the immediate future:

1. That the general width of rural roads should be 18 feet, with a few exceptions, which should be 27 feet.
2. That concrete is not a suitable material for rural roads, because of high initial cost, uncertainty of sufficiently long life and the great disadvantages of construction in half widths. (This conclusion does not apply to new roads.)
3. That it is desirable to extend the use of bituminous and tarred macadam for road surfaces to the utmost extent of financial possibilities, selecting the more important roads for early treatment.
4. That the surface-tarring of water-bound macadam should be continued, pending conversion to bituminous macadam, and that district roads subject to mechanically-propelled traffic should be surface tarred wherever possible.
5. That the Ministry of Transport's standard road signs should be adopted forthwith, and every reasonable endeavor made to proceed with the scheme.



Bolton Woods Highway Follows the Course of the Wharfe River for Many Miles and Is Said to Be One of the Few Absolutely Level Roads to Be Found in British Isles.

Use of Trucks and Trailers

Digest of State Statutes Regulating Weight and Dimensions of Motor Trucks and Number of Trailers Permitted to Be Hauled by Them

THE following digest of state laws regarding the size and weight of motor trucks is compiled from measures that were in effect on April 1 of the present year. These restrictions do not include those imposed by counties, towns, cities and other political sub-divisions of the states. Generally speaking, however, local ordinances contrary to the state laws are forbidden or cannot be enforced.

All dimensions and weights given are the maximum permitted by the law and the standard ton is considered as 2000 pounds.

Alabama—Size not limited. Gross weight 20,000 pounds. Number of trailers not limited. Special permits not mentioned.

Arizona—No state law.

Arkansas—No state law.

California—Outside width of track 112 inches; outside width of bed of vehicle and load 102 inches. 30,000 pounds gross weight for vehicle with four wheels; 40,000 pounds for one with six wheels having its three axles at least 96 inches apart. On other than metal tires weight must be distributed not more than 800 pounds per inch of tire width; on metal tires, 600 pounds. (State department of engineering may reduce these limits in case of bridges, viaducts, etc.) Number of trailers, two. On application in writing state department of engineering may grant permits to operate heavier or wider loads, or more than two trailers or increase the permissible wheel weights.

Colorado—No state law.

Connecticut—Overall width, 114 inches. Gross weight, 12½ tons; weight per inch of tire width, 500 pounds on metal tires; 700 pounds on other tires. State highway commissioner may restrict use of commercial motor vehicles of over four-ton capacity on trunk lines or state aid highways. Number of trailers not limited. On written application state highway commissioner, or other authority having charge of the repair or maintenance of any highway or bridge, may grant permits allowing operation of prohibited vehicles.

Delaware—Width of vehicle, 96 inches; height, 146 inches. Gross weight, 13 tons; weight per inch of tire width, 700 pounds; gross load of metal tired trailers, three tons. Number of trailers not limited. State highway department may issue special permits to operate vehicles exceeding weight limits.

District of Columbia—Size not limited. Gross weight on bridges with wood floors, six tons; on any other bridges, 15 tons. Number of trailers, one. Engineer commissioner may issue written permits for operation of heavier vehicles over bridges.

Florida—No state law.

Georgia—No state law.

Idaho—No state law.

Illinois—Width of vehicle and load, 96 inches; total length of vehicle and trailers, 65 feet. Gross weight, eight tons for one axle; weight per inch of tire width (as measured at the line of contact of the tire with the road), 800 pounds. Number of trailers not limited, except by section one. Highway officials may grant permission for operation of heavier vehicles or longer road trains.

Indiana—Size not limited. Weight, 10 tons capacity. Number of trailers not limited. Special permits not mentioned.

Iowa—Width of vehicles and load, 96 inches. Gross weight of vehicle and load, 14 tons; weight per wheel, four tons; weight per inch of tire width (as measured at the line of contact of the tire with the road), 800 pounds on hard-surfaced highways and 400 pounds on earth, gravel or similar surfaces. Number of trailers not limited. Special permits not mentioned.

Kansas—No state law.

Kentucky—Size not limited. Gross weight, 15 tons; weight per inch of tire width (as measured at the line of contact of the tire with the road), 500 pounds for metal tires and 800 pounds for other tires. Number of trailers not limited. Special permits not mentioned.

Louisiana—No state law.

Maine—Size not limited. Gross weight, nine tons; weight per inch of tire width, 800 pounds. Number of trailers not limited. Highway officials may permit operation of heavier vehicles over highways under their control.

Maryland—Width of vehicle, 90 inches. Gross weight, 10 tons; weight per inch of tire width, 650 pounds. Vehicles rated to carry more than five tons not registrable. Number of trailers not limited. Highway officials may grant permission to operate heavier vehicles on highways subject to their control.

Massachusetts—Width, 96 inches; length of single vehicle, 28 feet; total length of a combination of vehicles, 65 feet. Gross weight, 14 tons; weight per inch of tire width, 800 pounds. Number of trailers not limited. Highway officials may grant permission to operate heavier or larger units over highways under their jurisdiction.

Michigan—Track of trucks and trailers, 75 inches between tire center lines; overall width, 96 inches; overall height, 150 inches; aggregate length of a combination of vehicles, 60 feet. Weight per wheel, 700 pounds for tires two inches wide up to 3200 pounds for tires seven inches wide on wheels 32 inches in diameter. These maxima are greater for wheels of larger diameter, those for 44-inch wheels being 1.6 times those for 36-inch wheels. Number of trailers, two. Special permits not mentioned.

Minnesota—No state law.

Mississippi—No state law.

Missouri—No state law.

Montana—No state law.

Nebraska—No state law.

Nevada—No state law.

New Hampshire—No state law.

New Jersey—Length, 26 feet six inches; width, 92 inches; height, 150 inches. Gross weight, 15 tons; weight per inch of tire width, 800 pounds. Number of trailers, one. Highway officials may issue permits for operation of prohibited vehicles over highways under their jurisdiction.

New Mexico—Size not limited. Tire rim must be at least three inches wide if vehicle's rated capacity exceeds one ton. Number of trailers not limited. Special permits not mentioned.

New York—Overall width, 96 inches; height, 150 inches. (Outside cities.) Gross weight, 12½ tons; weight per inch of tire width, 800 pounds. (Outside cities.) Number of trailers not limited. Special permits not mentioned.

North Carolina—Size not limited. Weight, 5½ tons capacity. Number of trailers not limited. Special permits mentioned.

North Dakota—No state law.

Ohio—Size not limited. Weight per inch of tire width (as measured between the flanges of the rim), 800 pounds for rubber tires of all sizes, 500 pounds for iron or steel tires up to and including those 12 inches wide and 800 pounds for metal tires more than 12 inches wide. Number of trailers not limited. Special permits not mentioned.

Oklahoma—No state law.

Oregon—Size not limited. Weight, five tons carrying capacity; weight, per inch of tire width, 600 pounds. Number of trailers not limited. Special permits not mentioned.

Pennsylvania—Overall width, 90 inches; overall length, 28 feet. Gross weight, 13 tons; weight, per axle, 19,500 pounds; weight, per inch of tire width, 800 pounds. Number of trailers not limited. State highway commissioner may issue permits for operation of prohibited vehicles.

Rhode Island—Size not limited. Gross weight of trailer, two tons. Number of trailers not limited. State board of public roads may issue permits for heavier trailers.

South Carolina—Size not limited. Weight, four tons capacity. Number of trailers not limited. Highway authorities may grant permit for operation of heavier vehicles.

South Dakota—No state law.

Tennessee—No state law.

Texas—Width of body, 84 inches. Weight, per wheel, 5000 pounds; weight, per inch of tire width, 500 pounds. Number of trailers not limited. State highway department may issue permits for heavier or wider loads.

Utah—Size not limited. Gross weight, 10 tons. Number of trailers not limited. Special permits not mentioned.

Vermont—Width, 96 inches; height, 146 inches. Gross weight, 6¼ tons in towns or incorporated villages, elsewhere five tons; weight, per inch of tire width (as measured at the line of contact of the tire with the road), 600 pounds. Number of trailers, one. Local authorities may issue permits to operate prohibited vehicles over highways subject to their control.

Virginia—Size not limited. Gross weight, 12 tons; weight, per inch of solid tire width (as measured between the flanges of the rim), 700 pounds. Number of trailers not limited. Special permits not mentioned.

Washington—Size not limited. Weight, five tons for loads outside cities of first or second class. Number of trailers not limited. Cities of first and second class may by ordinance permit heavier loads within their borders.

West Virginia—Width, 90 inches. Gross weight, 15 tons; weight, per inch of tire width, 600 pounds. Number of trailers not limited. Highway officials may issue permits for operation of wider or heavier vehicles over highways subject to their control.

Wisconsin—Overall width, 96 inches; length, 30 feet. Gross weight, 12 tons; weight, per axle, nine tons; weight, per inch of tire width, 500 pounds. Number of trailers not limited. In cities of first class officials may issue permits for operation of road trains not longer than 100 feet.

Wyoming—No state law.



Interior View of Crosstown Garage, Detroit, Mich., Showing Roof Construction and Unusual Window Area—Perspective Gives Good Idea of Immense Size of Building.

Largest One-Story Garage In World

Recently Built Service Station Covers Five Acres of Ground—Is Fireproof Throughout and so Designed As to Provide Pleasant Working Conditions For Employees.

FROM the standpoint of lighting, ventilation and fire protection, the recently completed Crosstown garage is one of the most modern in the country. The Detroit home of the Roamer car has become one of the show places of the Motor City and is invariably pointed out to tourists and visited and inspected by them with unusual interest.

Covering nearly five acres of ground, it is probably the largest one-story garage in the world and the finest one-story structure devoted entirely to automobile sales, service and storage in Detroit.

The building, located at the corner of Woodward and Putnam avenues, has a frontage of 187 feet on Woodward avenue, extends an entire block—and a very long block, too—from Woodward avenue to John R street, fronting on Putnam avenue, and also has a frontage of 187 feet on John R street. Having a floor space of 137,000 square feet, more than 1600 cars can be stored every night on the single floor without crowding.

The Crosstown garage was designed by Stratton & Schneider, engineer, and was constructed by the Haw Construction Co. The building is unique in design and a splendid example of an up-to-date sales, storage and service plant. Its construction is entirely of concrete, steel and brick, and large areas of Window Walls are used in its wall construction to light and ventilate it. Daylight is distributed to all parts of the garage through the walls of Fenestra windows which, with numerous ventilators, make the speedy clearance of smoke and gases an easy matter.

Every inch of the five acres of floor space is well utilized and every known means have been taken to make the place attractive and convenient for the motorist.

The sales room is large and attractive, though the decorations—done under the direction of Mrs. Sydney Corbett—are practical, simple and pleasing. The furniture for the show rooms is especially

designed and furnished to harmonize with the decorations. The night lighting effect is striking. In brief, from every standpoint of size, convenience, location and equipment the home of the Roamer in Detroit is, without question, one of the finest in the country, and there is no doubt, according to veteran travellers of the motor car industry, but it will be taken as a model by numerous motor car distributors in other cities.

Just behind the sales room is the quick



One of the Bays in Repair Department of Crosstown Garage, Showing Arrangement of Windows to Conserve All Day Light Possible.

service department, where one drives in and out again after a hurried inspection and adjustment. Adjoining this is the service stock room, well equipped and with a system that does not entail delays. Then there is the repair shop, where more serious repairs, the results of accidents, overhauling, etc., are looked after, and here are found mechanics who know their business.

Beyond the shop is the enormous garage and, notwithstanding its tremendous

storage capacity, each car has its space allotted to it marked off on the floor, giving plenty of room on all sides. Each car space directly adjoins a wide aisle, and every car in storage can be moved in or out without having to move any cars out of the way to do so. All of the aisles are so wide that in case of a fire the fire department could run right down any of them with their fire trucks to put out the blaze.

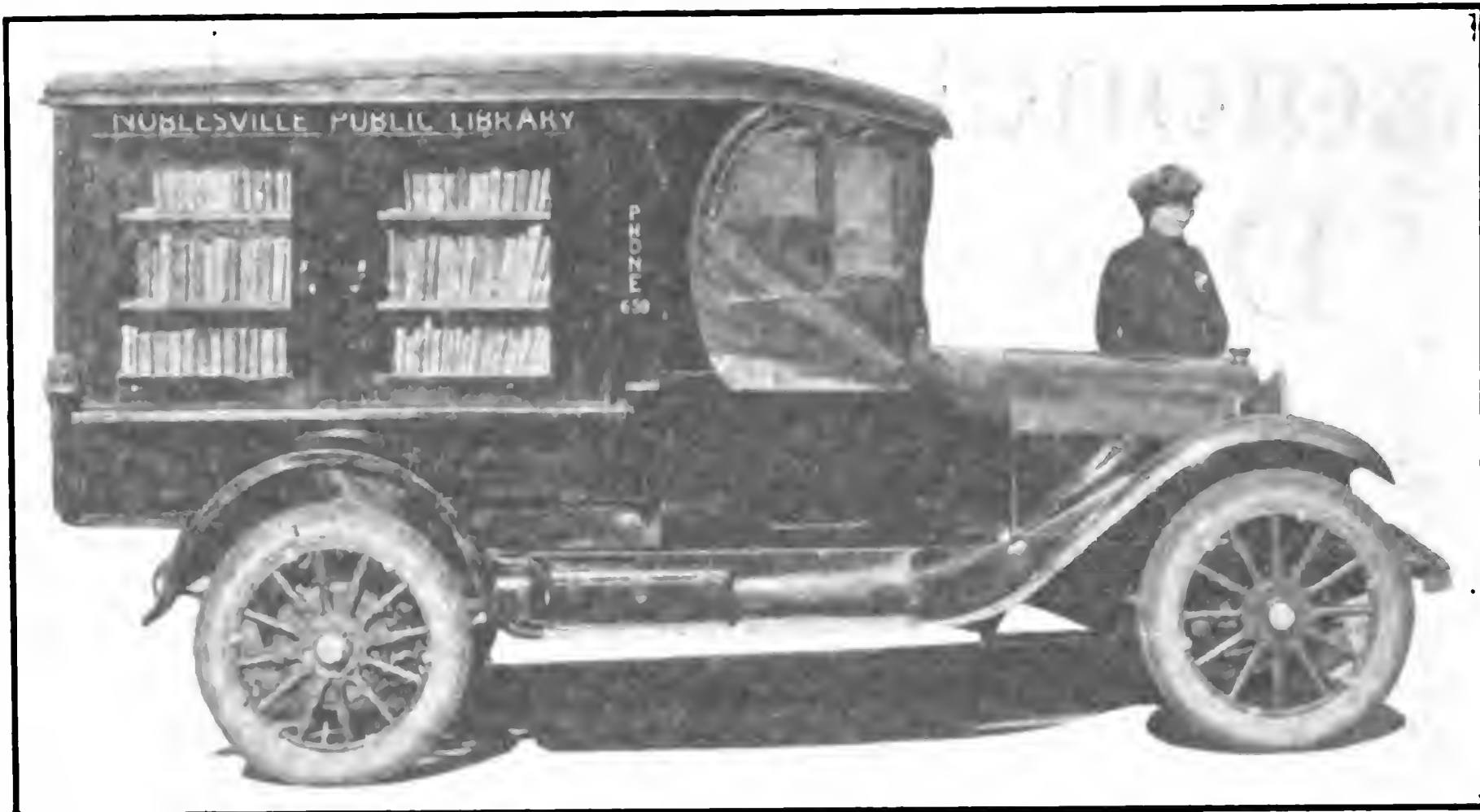
The storage service offered to its patrons by the Crosstown Corporation is very complete. There is a service contract for him who only wants storage and another contract for him who wants storage with washing and polishing of the car once a week, and many other service contracts of various characters running up to the most complete care and inspection, which gives the motorist daily washing and polishing of his car, attention to minor adjustments, care of tires and delivery service so that the car owner has only to call the garage and an automobile is sent to his residence to get him and bring him down for his car and also to take him home at night after leaving the car for storage.

The principal personnel of the Crosstown organization, in charge of W. J. White, general manager, is as follows: Sales manager, W. J. Senical; shop superintendent, L. J. Brewer; general superintendent, Frank Brunnell; service manager, Thomas A. White; office manager, Glen McHale; sales representatives, J. A. Benoit; night superintendent, Jack Taylor. They are all men of experience in the manufacture, sale and maintenance of high-grade motor cars.

The Crosstown Corporation has also established sub-agencies in Grand Rapids and Muskegon.

Robert J. Schefferly, formerly chief engineer of the California Motor Car Co., Los Angeles, Cal., has been elected president and general manager of the Quality Foundry & Manufacturing Co., which is also located at Los Angeles.

Motor Library Helps Farmers



Keen Appetite for Books Created by Novel Plan of Distribution— “Parnassus on Wheels” Destined to Become Big American Institution

NOT so many years ago you heard the argument that the automobile was destined to monopolize people's time, that they would have no more leisure hours for reading and that the nation would consequently degenerate below its present standard of culture.

Since then, of course, it has been proved pretty definitely that exactly the reverse is true. The automobile saves such an enormous amount of time that people have more opportunity than ever to read. There is no danger that the motor car and culture will ever conflict.

As a matter of fact, there are a number of librarians in the country today who will tell you that the automobile is helping them introduce traces of culture into communities that would otherwise fail to develop an appetite for books for years to come. These librarians are taking their books to the farms—by automobile. They are introducing the motorized library, and the success which has attended their efforts indicates that it is one of the certain American institutions of the future.

Particular success with the motorized library is found in the case of Noblesville, Ind., a city of about 5000, situated about 20 miles north of Indianapolis. In an exceedingly interesting article describing the methods and results employed in delivering the library to the farmer's door, Miss Lula M. Miesse, Noblesville's librarian, says:

“We tried both adult and juvenile stations in schoolhouses and homes and found the adult section was not well patronized. The country schools are open only five days a week and only six months a year. So the house to house plan of service was determined upon. We visited some other cities, where library autos were in use, and after looking over various chassis and trucks, we decided upon a Dodge Brothers business car. In the first place it did not need a great deal of remodelling for our purpose. It was strongly built and highly recommended by people who were using it, for dura-

bility under hard service, which we knew our car must receive.

“The seats were already comfortable. We had the wire screens and the entire back removed. The steel sides were bent over seven inches and used for shelves in front of the book cases. Inside the car we built our book cases of oak, with glass doors opening outward on both sides of the truck, so that it advertises its own wares as it travels over the country. The shelves slant slightly back to hold the books away from the glass.

“Our territory is now laid in 16 runs, but we must add at least five to these in order to cover it. Some of our trips are long. Number one, for instance, is 42 miles long and begins and ends 10 miles from Noblesville. We have driven our car through fresh gravel, mud and over ice. As we travel four days a week we cannot wait for good roads. The work is very interesting and grows more so as the librarians and the people get better acquainted. The demand for books has been so great that it has been almost impossible to satisfy both the city and the country, as we were not expecting and not well enough prepared for the voracious appetite for reading matter which we created.

“Our library car is called ‘Parnassus’ after Christopher Morley's book, ‘Parnassus on Wheels.’ It is a very interesting little book, about book peddling. We use an old-fashioned dinner bell to call our patrons, this being more effective than the horn. One side of the car is used for adult and the other for children's books. We carry about 300 books on the shelves and extra fiction and juvenile books inside. Fiction is in greatest demand, but we also circulate books on farming, travel, history, literature, music and Bible literature. We carry fairy stories and bear stories for the younger children and have introduced many youthful readers to Little Women, Tom Sawyer and Pinocchio. One great advantage of our system to the rural patrons is that there are no fines attached to

books charged to the library auto cards.

“The people in the country think we made a good choice of a car, as it is a good car, but not the most expensive. They make many comments on the car, especially since we have met the men in the homes.

“The Indiana Library commission is trying to push the country library idea as are many other states. It is much better to have a strong central library, where decent salaries are paid, than so many small libraries, barely alive, and of not much use in the community. The Indiana librarians are very much interested in our work.

“Our car now regularly visits almost 800 homes and has about 1500 patrons, the circulation running from 100 to 150 per run. We will give more service when the remainder of our territory is organized. It is the most interesting library work we have ever done and we hope all of Indiana may have similar service in the near future.”

OBJECT TO NEW ORLEANS PROPOSED TAX.

NEW ORLEANS, LA., Sept. 13.—The rumored special automobile tax of \$10 on each car to aid the city's programme of paving is causing much concern among the truck owners and dealers of New Orleans. The Constitutional convention recently made it mandatory for the State Legislature at its next session to levy a minimum tax of \$15 a car on every automobile and truck in the state to foster a state-wide highway plan and likewise placed a tax of two cents a gallon on gasoline used and, with the possibility of the national Congress adding another burden, the municipal suggestions are naturally not taken to kindly.

It is said that the proposition has the backing of the paving committee of the Association of Commerce and members of that committee informally discussed the subject with one of the city commissioners and the city engineer.

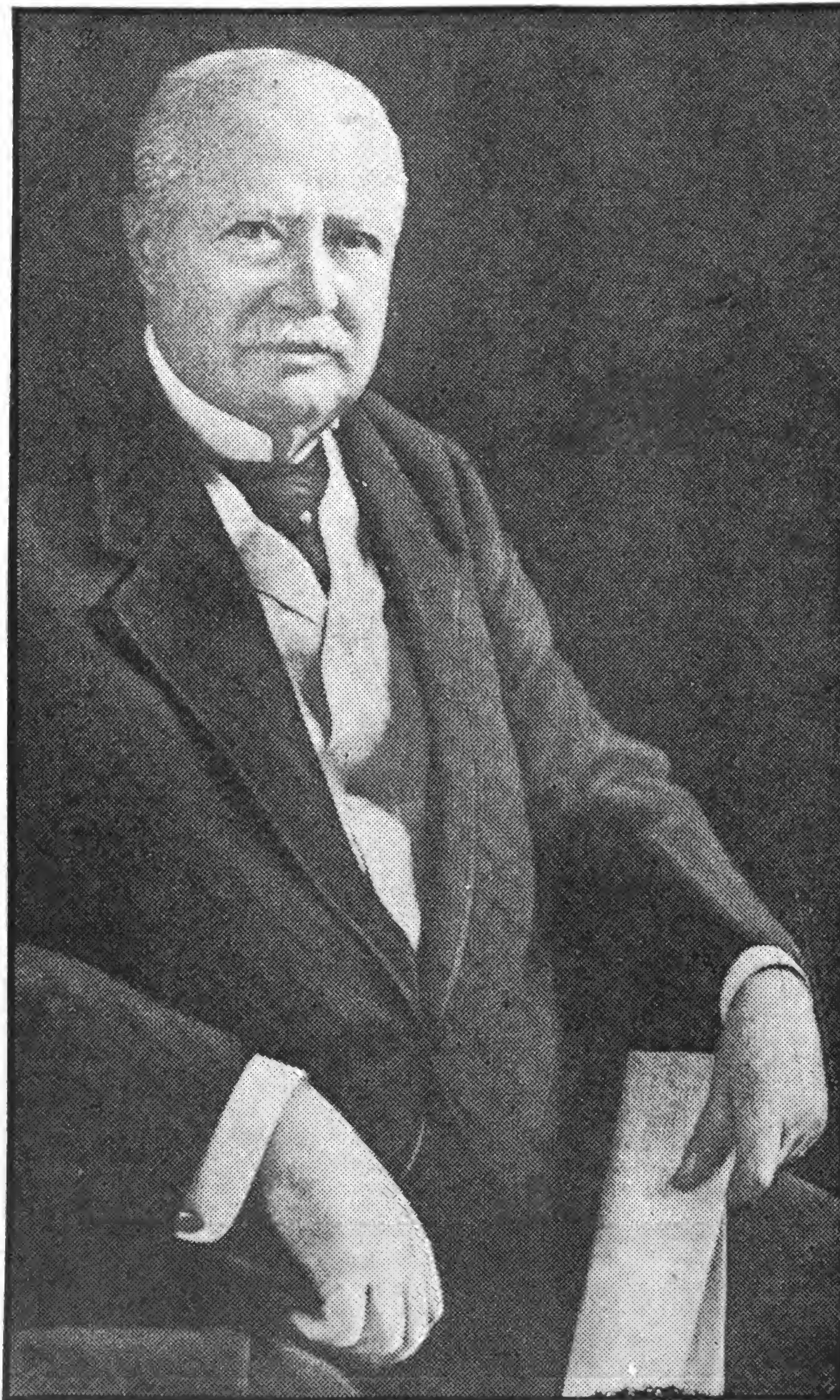
Colonel Samuel Pomeroy Colt Dies at Bristol, R. I., Home

HEAD OF UNITED STATES RUBBER CO., PROMINENTLY IDENTIFIED WITH MANY GREAT ENTERPRISES, FAILS TO RALLY FROM PARALYTIC STROKE—RHODE ISLAND MOURNS PASSING OF BRILLIANT CITIZEN—WAS IN HIS 70TH YEAR.

ENDING an heroic fight which he had made since Aug. 5, when he suffered a paralytic stroke that left him with paralysis of the left side Colonel Samuel Pomeroy Colt, lawyer, financier, and a national figure in the industrial world, died at his home in Bristol, R. I., at 1:10, Aug. 13.

The history of great emprise records no greater case of individual achievement than that which is offered by the life of Colonel Colt. Possessed of a versatility of intellect, a keen foresight and the will to interpret that which he envisioned, his unusual talents found expression in a diversity of ways. He was a noted lawyer and had been attorney-general of the State of Rhode Island. He founded both the United States Rubber Co. and the Industrial Trust Co., the former an organization that dominates the rubber business of the world; the latter one of New England's greatest banking institutions; either of which amply testifies to Colonel Colt's native acumen and farsightedness even as they exemplify his acknowledged supremacy in two distinct lines of endeavor. To do a thing well was not enough for him. His infinite capacity for taking pains meant that he must attain the perfection of accomplishment and his every undertaking bears witness to the working of that inner force which lifts mere talent to genius.

Colonel Colt gave early promise of unusual legal and banking talents and it was through recognition of this that he



COLONEL SAMUEL POMEROY COLT.

first came in contact with the rubber business, being chosen by the bankruptcy court as a receiver for the Bristol Rub

ber Co. at a time when that concern, a pioneer of the rubber industry, was involved in financial troubles. This was in 1887 and the condition of the company was such that only a man of unusual ability could have hoped to make it again productive, but Colonel Colt accomplished this and not only liquidated its debts within the year, but also showed a profit.

To make matters harder the rubber business at this time was undergoing a marked depression and the outlook was discouraging. But Colonel Colt, with his prognostic faculty saw clearly the great future of the industry and, after making a basic study of the business set out to place it on its feet, confident that he would succeed.

In 1888 he founded the National India Rubber Co., which within a short time was recognized as the leading rubber company of the country. By this time Colonel Colt's executive ability, coupled with his unusual knowledge of industrial and financial affairs, had gained the attention of men of prominence in the business world, and when, shortly after the formation of the National India Rubber Co. he unfolded his plans for the organization of the United States Rubber Co., which he brought about through the consolidation of 40 other competitive concerns, he met with little opposition and the result of his good judgment is

seen in this giant organization, which today is by far the largest of any in the rubber world.

Those who knew Colonel Colt best always have maintained that the outstanding secret of his great success lay in his ability to pick the right man for the right place. Employees were given the work that best suited them and each was made to feel that he alone was responsible for his own success. Colonel Colt always believed in recognizing the efficiency of the individual in a material way, and no salary was too large for the specialist who could get results.

Samuel Pomeroy Colt was born in Paterson, N. J., Jan. 10, 1852. He received his early education at Hartford, Conn., and later went to school at Bristol, R. I., and also attended Anthon's grammar school in New York City. He entered the Massachusetts Institute of Technology in 1870 and was graduated three years later. The next year he spent in travelling through Europe. Returning in the fall of 1874 he entered the Columbia law school, was graduated in 1876 and admitted to the New York bar in May of that year. He then came to Rhode Island, where he studied law in the office of Thurston & Ripley, one of Rhode Island's prominent legal partnerships of those days, and was admitted to the Rhode Island bar Jan. 1, 1877.

It was during this legal apprenticeship that he obtained his rank of colonel, being aide-de-camp on the staff of Governor Henry Lippitt during 1875-76-77. Elected from Bristol to the General Assembly he served three years, and was assistant attorney-general of the state for the following two years. In 1882 he was elected attorney-general on the Republican ticket, of which party he was a prominent member and filled the office for four years, after which he again visited Europe.

Colonel Colt was a member of many prominent clubs, which included among others the Hope, University, Anawan and Turks Head, all of Rhode Island, the Metropolitan club of New York, the Rhode Island Bar association and the Society of Sons of Colonial Wars. He was also a life member of the Pen and Pencil club, an organization composed of Rhode Island newspaper men. He belonged to no fraternal orders.

Mourners from every walk in life, from the factory laborer to the heads of giant corporations were present at Colonel

Colt's funeral, which was held at his home, "Linden Place," situated in Bristol, on Aug. 16.

Rhode Island Honors Colonel Colt.

With the presence of Governor San Souci, accompanied by his staff and other state officials, Rhode Island joined in honoring the memory of one of her most distinguished sons, a man who for many years had been known as a potent factor for good by the entire commonwealth. The town of Bristol, Colonel Colt's home, paid signal honor to him as the man who

United States senator from Rhode Island; Hon. William W. Douglass, former chief justice of the Supreme court of Rhode Island; Walter S. Ballou, director of the Industrial Trust Co., and Ezra Dixon, director of the Industrial Trust Co. of Providence.

Among the many prominent men who attended the funeral were Homer E. Sawyer, Ernest Hopkinson and W. F. Parsons, vice presidents of the United States Rubber Co.; Samuel Norris, secretary of the United States Rubber Co.;

William H. Blackwell, treasurer of the United States Rubber Co.; John D. Carberry, assistant treasurer of the United States Rubber Co.; James N. Gunn, president of the United States Tire Co.; F. V. Flynn, secretary to the chairman of the board; H. Stuart Hodgkiss, president of the General Rubber Co.; William F. Bass, vice president of the General Rubber Co.; John W. Bicknell, treasurer of the Rubber Plantations, Inc., and James B. Sinnott of the H. L. Horton Co.

All of these men had been closely identified with Colonel Colt during a period covering many years, and several of them had been his associates for more than a decade.

Among them are those who owe him a more than ordinary debt of deep gratitude for his friendly services and advice.

In addition to the many acquaintances who attended the funeral there was a large number of persons who, though not personally knowing Colonel Colt, came out of respect of the memory of one who was ever known for his sterling good will and thoughtful deeds.

** ** *

He who writes the biography of Colonel Samuel Pomeroy Colt will say that he was

much admired by his associates. This is true, but it is only a part of the story. This writer believes that the outstanding characteristic of Colonel Colt—the one thing that distinguished him as a truly great man—was the fact that he so treated his subordinates as to ever maintain their love and respect. No greater brief can be written of any man, and Colonel Colt, humanitarian, gentleman, and good citizen, would want no greater.

CORPORATIONS IN WHICH COLONEL COLT HELD OFFICE:

American Commerce Co.
Atlantic Coast Lumber Co. (chairman).
Bristol and Warren Water Works, (president).
Canadian Consolidated Rubber Co., Ltd.
Dominion Tire Co., Ltd.
General Rubber Co., (chairman).
General Rubber Co. of Brazil, (chairman).
General Rubber Co., Ltd., London.
Holland-American Plantations Co., (chairman).
Industrial Trust Co., (chairman).
Joseph Banigan Rubber Co.
Maiden Lane Realty Co.
Marvel Rubber Co., (president).
Mechanical Fabric Co., (chairman).
Meyer Rubber Co.
Narragansett Electric Lighting Co.
National India Rubber Co., (president).
Naugatuck Chemical Co.
Netherland Langkat Rubber Co., (chairman).
New Brunswick Rubber Co.
New England Telephone and Telegraph Co.
Newport, R. I., Trust Co.
Oneida Timber Co.
Otter Creek Boom and Lumber Co.
Providence Telephone Co.
Providence Tribune Co., (president).
Revere Rubber Co.
Rhode Island Insurance Co.
Rhode Island Safe Deposit Co., (president).
Rhode Island Society for Prevention of Cruelty to Animals, (vice president).
Rubber Regenerating Co., (chairman).
St. Pare Rubber Co., (chairman).
Title Guarantee Co.
United States Export Co., (chairman).
United States Rubber Co., Ltd., London.
United States Rubber Co. of Canada, Ltd.
United States Rubber Plantations, Inc., (chairman).
United States Tire Co., (chairman).
United Timber Corporation.
Woonsocket Rubber Co.

had done more for the welfare of the community than any other, and all business places were closed during the service, which was held at 3 o'clock.

The eight honorary bearers were Lester Leland, vice president of the board of directors of the United States Rubber Co.; Charles B. Seger, president of the United States Rubber Co.; Colonel H. Martin Brown, president of the Industrial Trust Co.; Colonel Samuel M. Nicholson, vice president of the Industrial Trust Co.; Hon. Henry F. Lippitt, former

Solves Transportation Problem

Bus Provides Economical and Efficient Service in Transportation of Passengers on Narragansett Pier Railroad—Authorities Are Well Satisfied and May Use Similar Equipment on Other Roads

THE new owners of the Narragansett Pier railway, who acquired control of this line a short time ago from the New York, New Haven & Hartford Railroad Co. have since been studying how best to provide an economically operated road, as well as an efficient transportation system.

The present bus has more than met the requirements and has the approval of the riding public. The bus arrived in Kingston on July 4th and was placed in commission at noon of July 9th. Ever since then it has been running with the smoothness of a well regulated clock and giving service never before attempted to and

Superintendent Samuel E. Gould explains that the bus is run supplementary to the steam trains that handle the baggage and freight and the larger part of the passenger traffic of the road and says that it affords accommodations that have already made it popular with the large number of Providence people who have cottages at the Pier.

The schedule provided, together with that of the steam trains, enables the Narragansett Pier management to make connections with every train going East or West making stops at Kingston.

President E. J. Pearson of the New York, New Haven and Hartford personally inspected the bus recently and was very much impressed with its efficiency and economy and it is thought that he will probably place orders for similar but larger busses for several of the New Haven branch lines.

ANNUAL MEETING OF S. A. E. TO BE HELD JAN. 10-13.

NEW YORK, Sept. 14 —The Society of Automotive Engineers has announced that its annual meeting will be held in New York City, Jan. 10-13. This follows the established custom of holding the meeting during National Automobile Show week, when interest in the industry centers in the eastern metropolis. The S. A. E. dinner, which has become established as one of the most representative assemblies of automotive men during the year, will be held Thursday, Jan. 12. The celebrated S. A. E. carnival is set for the night preceding the dinner, Jan. 11, and the meetings committee is busy arranging details for both of these events even at this early date.

The plans for the technical sessions are developing and indications point to the arrangement of a very comprehensive and educational programme.

The meetings committee suggests that members desiring to present papers communicate with the society offices at 29 West 39th street, New York, without delay, since it is desirable that the acceptance of all manuscripts be decided by Oct. 1 in order to provide sufficient time for preparation and circulation of the preprints.

OUTPUT OF CRUDE OIL LOWER.

The daily average of the production of crude oil in the United States for the week ending Aug. 13 was 11,770 barrels below that of the previous year for the same period of time, according to figures compiled by the American Petroleum Institute. The total daily average gross production for the week ending Aug. 13, 1921, was 1,304,070 barrels, and for the same week in 1920, 1,315,840.



That This Bus Is an Efficient Auxiliary to the Steam Train Has Been More Than Proven by Two Months' Summer Service.

As this is a short branch line connecting the Pier colony with the main line and only four stops are made, the operation of steam train to accommodate the year round travel was found to be prohibitive, so the New Haven company relinquished control. The new company after studying the problem from all angles, decided that it could best be solved by placing in service a motor bus, running between the regular steam trains operated between Kingston and the Pier, meeting the requirements of local patronage, which means stops at Peace Dale, Wakefield and Narragansett, in addition to through trips that have also proved a great convenience. So successful is the operation of the bus that it is probable that similar, although considerably larger ones will be made use of over some of the New York, New Haven and Hartford branch lines.

When the new management took over the line, it was seen that there must be consistent retrenchment of expenditure, otherwise it must be wholly abandoned. A part of the working force was laid off and an attempt was made to further curtail operating expenses by installing a gasoline car, purchased at quite a cost. The car was not a success, although it is asserted that by reducing its gear it may yet be made fit for service.

from the noted summer resort.

The bus measures 24 feet over all, has a wheelbase of 16½ feet and an overall wheelbase of 18 feet. The chassis is a Mack, upon which is mounted a J. J. Brill & Co. body. Forward is a pony four-wheel truck, and at the rear two drivers. The engine is of 25.6 horsepower and is equipped with four speeds forward and one reverse, the fourth speed being direct drive on high.

The interior of the bus is finished in ash and the large window space makes it virtually an open car in warm weather. There are six transverse seats forward, two longitudinal seats in the center, and one long and two shorter transverse seats at the rear, all done in rattan, the whole accommodating 31 passengers, exclusive of the operator. The lighting of the interior is by six overhead electric lights that are in opaque shields, and by two others at the doors on either side of the driver's seat that are automatically turned on and off as the doors are opened or shut.

There is a regulation locomotive headlight front and back, and a swinging bell to warn those who are driving towards crossings of the approach of the car. There is no overhead whistle; in its stead one is attached to the cut-out. Without passengers the bus weighs 7500 pounds.

A Tip to the Truck Driver

Strict Attention to Oil and Lubricating Directions Given by Manufacturers Will Do Much to Lengthen Engine's Life—Drain Oil as Directed Removing Thinned Oil and Water at Proper Intervals

FACTORY instruction books all warn the truck driver to draw off the oil from the engine crank case oil reservoir at the end of the first 500 miles that the vehicle is driven, again at the end of 1000 miles of use and thereafter every 2500 miles. There are several reasons for this advice and the driver, by following instructions implicitly, finds that engine troubles connected with the lubricating system are reduced to a minimum.

Two sources of oil trouble tend to thin the oil in the engine reservoir, one being the entrance of unburned fuel, which is composed of a heavy percentage of kerosene and the second water that enters the oil in the original container, barrel or tank and is drawn off from the bottom with the oil.

The reason for drawing off the lubricating oil at the end of the first 500 miles is that the engine as it leaves the factory has all of its parts fitted tightly. During the first 500 miles of road travel the parts limber up and the engine oil takes the excess metal from the wearing parts and deposits it in the oil reservoir. Continued use of such oil causes the parts to wear faster. Draining the oil and refilling tends to hold this wear down to a low point or until the engine parts smooth up properly.

After the car has been driven approximately 2500 miles, the parts are worn to a glass smoothness and further wear is negligible provided that the oil is changed every 2500 miles.

Starting the engine cold with the choker pulled out all the way supplies a heavy charge of raw gas to the engine and causes the unburned gas to blow down the cylinder walls around the pistons and enter the oil in the engine base. Continued use of the choker causes a large amount of unburned fuel to become mixed with the oil and thinning results.

Changing frequently holds the body or viscosity of the oil at the correct consistency and provides proper lubrication for the wearing parts of the engine.

Water Enters Oil from Several Sources.

At first thought it is hardly conceivable that water can enter the lubricating system in large enough quantities to do any harm, but such is the case, as has been proved in several instances.

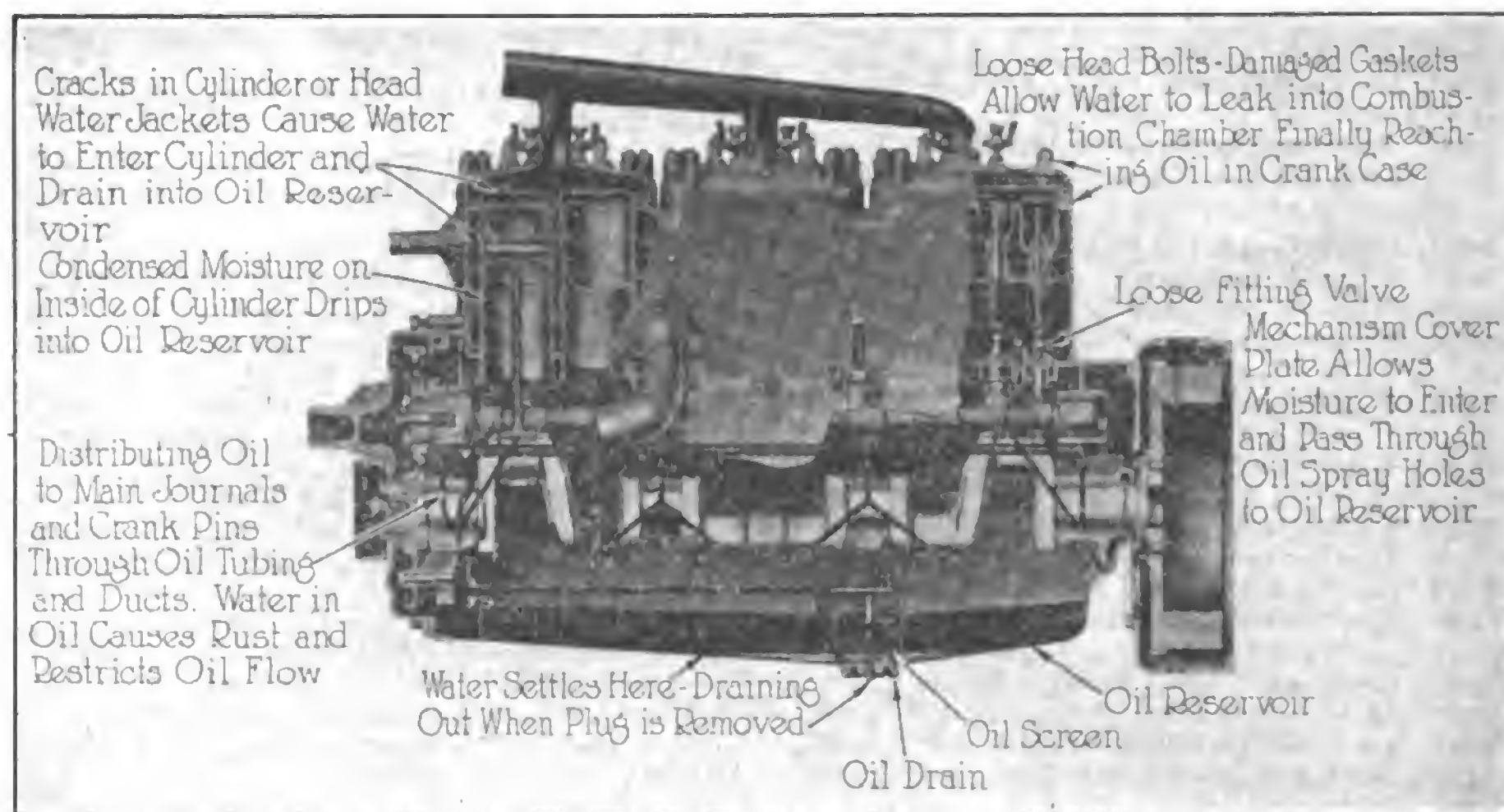
There are several ways in which water may enter and eventually cause trouble. It may enter the combustion chamber through a defective head gasket if the gasket is damaged, or the holding nuts are not drawn down sufficiently tight. Leaky core plugs in the water jackets will allow water to enter the cylinders. Leaving the truck standing during close muggy weather, will cause moisture to condense on the inside of the cylinder walls and drip down past the pistons into

the base, or it may enter around the enclosed valve mechanism if the cover is not fitted tightly, passing down through the oil spray holes into the base.

Cracks or blow holes in the cylinder will also allow water from the jackets to enter the cylinder block and mix with the oil. All external water leaks about an en-

Draining the oil at frequent intervals, according to the instructions of the manufacturer, will do much to obviate this trouble.

If an engine, which ordinarily requires considerable additions of oil to maintain the crank case level, suddenly seems to be using no oil, the probability is that



Sectional View of Six-Cylinder Engine Showing Where Water May Possibly Enter, Eventually Draining to Bottom of Oil Reservoir.

gine should be watched and stopped as soon as they appear, lest the oil be contaminated.

Moisture or water may also enter the engine reservoir from an outside source, such as oil barrels in which the oil has been shipped. It is often customary to store empty barrels at the oil refinery on the outside of the building on account of the lack of suitable storage space inside. If the plug in the end of the barrel happens to be left open during rain storms water will enter the barrel and may be unnoticed later when the barrel is refilled. Often oil barrels are left in locations exposed to the elements around small country garages and, through carelessness on the part of the garage owners, the bung or plug is taken out and left at one side. A sudden summer shower comes up and water enters the barrel, settling to the bottom of the oil and is drawn off for the first customer who calls. It is placed in the engine oil filler and mixes with the oil in the reservoir as the engine is operated, settling to the bottom as the engine stops. The amount may be small at the start, but continued use of oil having rain water or moisture in it has a tendency to harm the working units of the engine. In pressure oiling systems, the oil ducts, copper oil tubes, relief valve and oil gauge are liable to show the evil effects of water if the steel parts of the unit start to rust, as they eventually will if the truck is allowed to stand idle for long periods.

water is entering the lubricating system and maintaining the level.

When the crank case level rises instead of falls—an actual happening at times—water is undoubtedly finding entrance and the cause should at once be determined and removed.

Although the water does not mix noticeably with oil, while at rest, when the two liquids are violently beaten together, as when the engine is in operation, an emulsion is formed, and this is a very inferior lubricant. The best oils emulsify less than the poor oils, but even those of excellent quality develop a thick, curdled material, which is likely to obstruct the fine oil passages and is of little lubricating value.

It is, however, fortunate that it does settle in this manner, because it is the first to escape when the drain plug is removed, thus revealing its presence. If a sample is drawn into a glass jar occasionally, water, if present, can be readily detected.

Any appreciable amount of water present with the oil may cause rusting and sticking of the pistons if the engine is left idle for a long period of time and therefore the oil should be water-free when a car, truck or tractor is laid up for any reason. A high-grade lubricant is the cheapest in the end and its use with good judgment on the part of the motorist will tend to keep the engine in fit condition. Don't be "penny wise and pound foolish" in the matter of lubricant.

CALENDAR OF COMING EVENTS

Aug. 29-Sept. 3.—Columbus, O., State Fair.

Aug. 29-Sept. 3.—Milwaukee, Wis., State Fair.

September (2 weeks)—Topeka, Kan., Truck Show, Motor Hall, Fair Grounds.

September—Buenos Aires, Argentina, Show of Passenger Cars and Equipment.

Luxembourg—Luxembourg Agricultural Sample Exhibition.

Sept. 2-11—Detroit, Mich., State Fair.

Sept. 3-10—Hamline, Minn., State Fair.

Sept. 3-11—Sacramento, Cal., Seventh Annual Show During State Fair, Automobile Tent (30,000 Square Feet), Passenger Cars, Trucks, Tractors, Accessories and Agricultural Instruments, State Agricultural Society, Sacramento.

Sept. 4-9—Lincoln, Neb., State Fair.

Sept. 5—Colorado Springs, Col., Pike's Peak Automobile Races.

Sept. 5—Uniontown, Pa., Autumn Speedway Race.

Sept. 5—Constantinople, Turkey, Traction Trials Under Direction of Turkish Ministry of Agriculture.

Sept. 5-9—Hartford, Conn., State Fair.

Sept. 5-9—Wilmington, Del., State Fair.

Sept. 5-10—Wheeling, W. Va., State Fair.

Sept. 5-10—Lexington, Ky., Blue Grass Fair.

Sept. 5-10—Spokane, Wash., Interstate Fair.

Sept. 6-16—Utrecht, Holland, International Industry Fair.

Sept. 9-17—Ottawa, Ont., Motor Show.

Sept. 11-17—Louisville, Ky., State Fair.

Sept. 12-17—Syracuse, N. Y., State Fair.

Sept. 12-17—Topeka, Kan., Topeka Free Fair.

Sept. 12-17—Helena, Mont., State Fair.

Sept. 13-16—Douglas, Wyo., State Fair.

Sept. 14-16—Portland, Ore., Credit Convention, Motor & Accessory Manufacturers' Association.

Sept. 14-17—Detroit, Mich., Credit Convention, Motor & Accessory Manufacturers' Association, Statler Hotel.

Sept. 17-23—Hutchinson, Kan., State Fair.

Sept. 17-24—Nashville, Tenn., State Fair.

Sept. 19-23—Billings, Mont., Midland Fair.

Sept. 19-24—Yakima, Wash., State Fair.

Sept. 23-Oct. 2—Berlin, Germany, National Automobile Show, Auspices German Automobile Manufacturing Association and German Automobile Club.

Sept. 24-Oct. 1—Oklahoma City, Okla., State Fair.

Sept. 24-Oct. 1—Memphis, Tenn., Tri-State Fair.

Sept. 26-30—Pueblo, Col., State Fair.

Sept. 26-30—Trenton, N. J., Inter-State Fair.

Sept. 26-Oct. 1—Boise, Ida., State Fair.

Sept. 26-Oct. 1—Knoxville, Tenn., Eastern Fair.

Sept. 28-Oct. 8—New York City, Electrical Exposition, 71st Regiment Armory, Park Avenue and 34th Street; Exhibit Will Include Electric Vehicles, Electrical Equipment and Machinery.

Sept. 29-Oct. 1—Salem, Ore., State Fair.

Oct. 1-8—Cincinnati, O., Fall Automobile Show, Cincinnati Automotive Dealers' Association, Music Hall.

Oct. 1-8—Richmond, Va., State Fair.

Oct. 1-8—Chattanooga, Tenn., Inter-State Fair.

Oct. 3-6—White River Junction, Vt., State Fair.

Oct. 3-8—Birmingham, Ala., State Fair.

Oct. 3-8—Salt Lake City, Utah, State Fair.

Oct. 3-8—Muskogee, Okla., Free Fair.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolese, Paris.

Oct. 8-15—St. Paul, Minn., National Dairy Show, Minnesota State Fair Grounds.

Oct. 8-23—Dallas, Tex., State Fair.

Oct. 10-15—Indianapolis, Ind., Indianapolis Industrial Exposition, Indiana State Fair Grounds, Auspices of Indianapolis Chamber of Commerce.

Oct. 12-14—28th Annual Convention, National Implement & Vehicle Association, Congress Hotel, H. J. Samlet, Secretary, 72 West Adams Street, Chicago, Ill.

Oct. 15-22—Pittsburgh, Pa., Fall Show, Automotive Association.

Oct. 15-25—Atlanta, Ga., Southeastern Fair.

Oct. 17-22—Raleigh, N. C., State Fair.

Oct. 17-22—Jackson, Miss., State Fair.

Oct. 19-21—Cleveland, O., Convention and Tire Accessory Exhibition, Auspices National Tire Dealers' Association.

Oct. 24-28—Columbia, S. C., State Fair.

Oct. 27-Nov. 5—Macon, Ga., State Fair.

Oct. 27-Nov. 6—Shreveport, La., State Fair.

Nov. 4-12—London, England, British Motor Show, Society of Motor Manufacturers and Traders.

Nov. 8—Elkins, W. Va., Semi-Annual Meeting, West Virginia Automobile Dealers' Association.

Nov. 12-17—Jacksonville, Fla., State Fair.

Nov. 14-19—Chicago, Ill., Annual Convention and Business Exhibit, Automotive Equipment Association, Coliseum.

Nov. 22-24—New York City, Semi-Annual Convention, National Automobile Chamber of Commerce, Factory Service Managers; H. R. Cobleigh, Secretary.

Nov. 22-24—Chicago, Ill., Chicago Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 24—Los Angeles, Cal., Speedway Events.

Nov. 27-Dec. 3—New York City, Automobile Salon, Hotel Commodore.

Dec. 3-14—Brussels, Belgium, 15th Motor Show, Palais du Cinquantenaire. (Ballot for Stands Sept. 7.)

Dec. 6-9—Sioux Falls, S. D., Annual Convention, South Dakota Implement Dealers' Association; Exhibition of Farm Machinery Held in Connection.

Dec. 27-29—Chicago, Ill., Convention, American Society of Agricultural Engineers, Auditorium Hotel.

1922.

January—Chicago, Ill., Automobile Salon, Drake Hotel.

Jan. 7-13—New York City, National Automobile Show, National Automobile Chamber of Commerce, Madison Square Garden.

Jan. 28-Feb. 3—Chicago, Ill., National Automobile Show, National Automobile Chamber of Commerce, Coliseum.

Jan. 30-Feb. 4—Minneapolis, Minn., Tractor Show.

Feb. 6-11—Winnipeg, Manitoba, Canada, Second Annual Automotive Equipment Association, Board of Trade Auditorium. Secretary, W. L. Williams, New Stovel Building, Winnipeg.

Feb. 27-March 10—London and Birmingham, England, British Industries Fair.

March—Santiago, Chile, Annual Automobile Show.

March 11-18—Boston Show, Mechanics' Building.

May—Quito, Ecuador, Agricultural Exposition, Celebrating Centenary of Ecuador, Including Automotive Section.

September—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with Brazilian Centenary Associcao Automobilista Brasileira.

INCREASED TRANSPORTATION NEEDED IN MANY LINES.

Better Business Shown by Demand for Truck Hauling.

ALMA, MICH., Sept. 13.—So widespread has been the demand for the new Rapid Transit truck, recently announced by the Republic Motor Truck Co., Inc., that Colonel Frank E. Smith, the company's first vice president and general manager, states that orders for this model are being received faster than the trucks can be built and shipped.

"In addition to its sale indicating a healthy upward trend in general business lines, we are feeling decidedly gratified by the confidence which the business world has shown in our new model. We feel that merchants and manufacturers are ready to buy when assured that the product and price are what they should be. When we decided to build the Republic Rapid Transit, and sell it at a low price, we knew that we were tackling quite a problem. We had to sustain the Republic reputation for quality and de-

pendability, and at the same time enter a crowded field of competition.

"Our first aim was to convince the public that the Rapid Transit was not a converted passenger car chassis, but that its design and construction was strictly along truck lines, in conformity with Republic's past policy of building motor trucks exclusively.

"Our plans to date have worked out wonderfully well, and the new model has met with a very generous reception in all sections."

AUTO TRUCK LINES TO CONSOLIDATE.

VISALIA, CAL., Sept. 12.—Walling & Alexander, operating an auto truck line in the San Joaquin valley, is planning to consolidate its systems in a corporation known as the Valley Transit Co. To effect this it has asked authority of the Railroad commission to increase the capital stock of the Valley Transit Co. from \$50,000 to \$250,000.

AUTOS SUPERSEDE TRAINS.

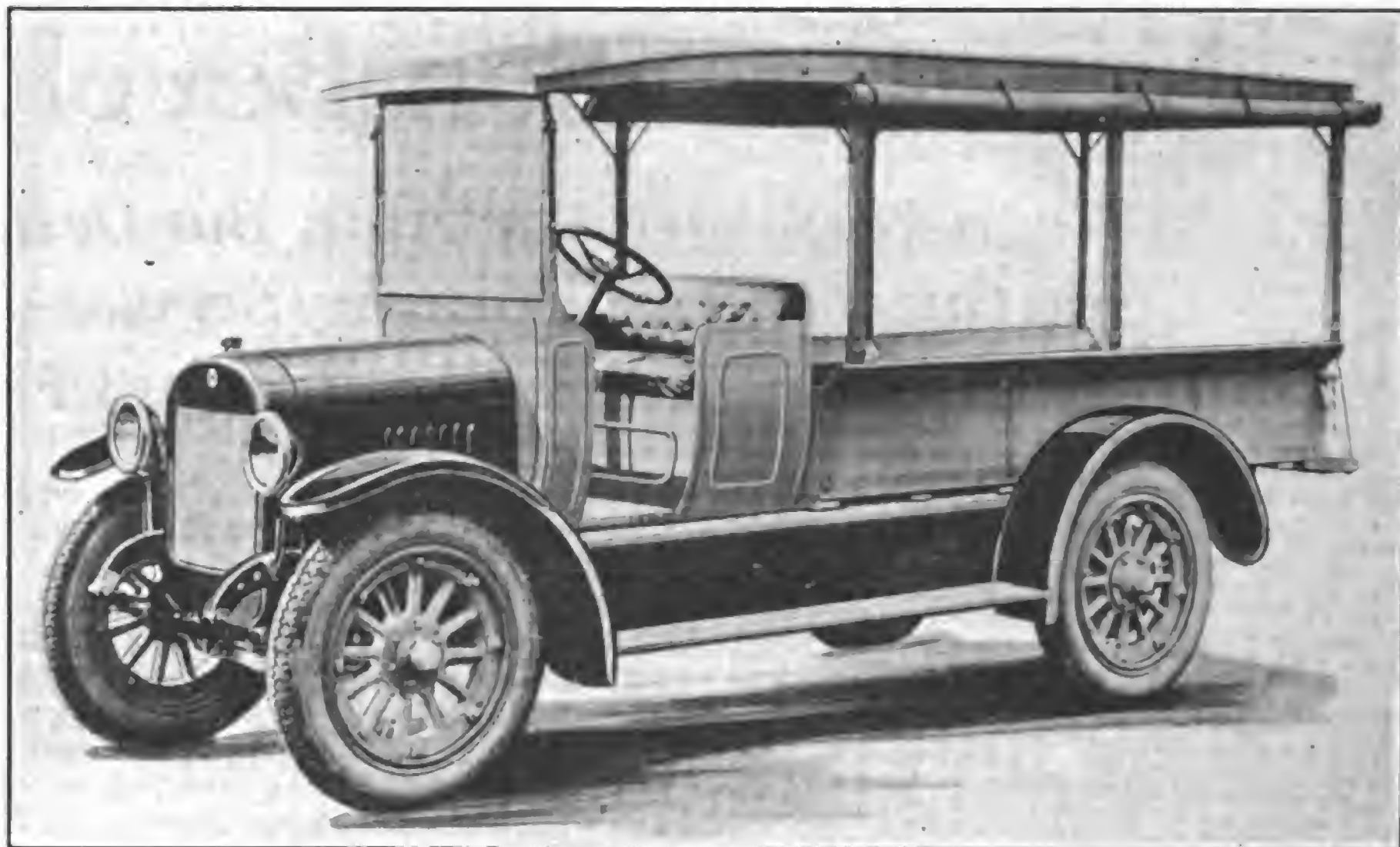
Boston & Maine Railroad Abandons Two Branch Lines.

BOSTON, MASS., Sept. 10.—An effect of automobile travel on railroad operation is shown in the decision of the Interstate Commerce commission, authorizing the abandonment of two branch lines of the Boston & Maine railroad in New Hampshire. One, extending from Cherry mountain to Jefferson in Coos county, a distance of 3½ miles, was built in 1892 for the accommodation of summer resort travel. The increase in motor car travel has caused a steady diminution in the passenger traffic, and in 1919 and 1920 the company reported that the average number of passengers per train was three, with total freight revenues in 1920 amounting to \$88 and total passenger revenues \$319.

The other branch line extending from Bethlehem Junction to Profile House, in Grafton county, a distance of nine miles, also had to give way to the competition of automobiles.

New Ruggles One Tonner

Adds to Light, High Speed Class a Truck of Proven Ability, Designed by Man of Long Experience in Motor Truck Manufacture.



New Ruggles One-Ton Speed Truck Meets Ideals of Most Critical Buyers.

A NEW contender for honors in the light-duty, high-speed hauling field, built by an old timer in the truck building industry, is the Ruggles One-Ton Business Truck, designed by Mr. Frank W. Ruggles, founder of the Ruggles Motor Truck Co., Saginaw, Mich.

In announcing the new model he states that it is a truck that combines speed with safety, power, traction ability, durability and dependability, ease of control, driver comfort, long life and value. This new one-tonner is the result of eight years of successful truck building experience, during which time Mr. Ruggles built the largest motor truck factory in the world and manufactured and sold more trucks than any other manufacturer.

The company maintains that the Ruggles Business Truck is one of the fastest, safest and staunchest, light-duty, one-ton trucks in the field and that the price is as low or lower than that of any other truck of its class. Maximum strength has been obtained by the use of superior materials and the proportioning of parts to give the correct construction balance. The 56-inch tread has been adopted as most satisfactory for all around city and country service.

Attention is called to the clean-cut make up of this rapid delivery job, which is designed heavy enough for the handling of a trailer and is a strong, rugged business truck built to carry sensible overloads. It is furnished with highest quality truck type pneumatic cord tires that will carry the truck safely over all types of roads. Severe tests have proven their unusual economy in upkeep. Features to which truck buyers are paying close attention.

Standard Construction Units.

The construction units which go into the makeup of the Ruggles Business Truck have been carefully selected as being the most dependable the present day automotive field affords. They include:

Continental Red Seal engine, Stromberg carburetor, battery generator ignition, starting and lighting system, Ruggles one-piece cast steel radiator with cellular core, multiple dry disc clutch, Fuller selective sliding gears, Ruggles Columbia $\frac{3}{4}$ -floating rear axle, specially designed pressed steel frame, semi-elliptic springs, artillery type wood wheels, Jacox worm and split nut type steering

gear and Alemite lubricating system throughout.

Ample Power Supplied by Continental Red Seal Engine.

The new Ruggles one-ton business truck is amply powered by a Red Seal Continental four-cylinder, four-cycle, L-head, vertical engine, cast en bloc and fitted with detachable head. This engine actually develops 35 horsepower at 1850 revolutions per minute and is suspended in the chassis at three points, two arms supporting it at the rear and a trunnion bearing supporting it at the front. Three main journals support the large sized crankshaft, which is supported by cast webs in the upper section of the crank case. Ignition is furnished from the battery generator system, which includes a spark advance lever mounted on the steering wheel post. The ignition generator also furnishes current to the storage battery for electric lights and the starting motor and horn. The cooling system consists of a thermo-syphon system, which circulates the water through the water jackets of the engine and through the Ruggles cellular core radiator, with radiation assisted by the belt driven fan.

Lubrication is furnished by a force feed system by means of a plunger type pump forcing the lubricant to the main journals and timing gears, the cylinders being supplied by a constant level splash system. Fuel is supplied through a Stromberg carburetor of the flat feed automatic type, the fuel vapor being further broken up by means of a super-heated air device or stove on the exhaust pipe, a feature which means economy of operation. An air adjustment is located on the dash while the spark and throttle control levers are mounted on the top of the steering post column.

Power Transmission System.

In connection with the engine is the 13-inch multiple dry disc clutch completely enclosed in a standard S. A. E. bell housing. The three-speeds selective sliding gear type transmission gear shift is in unit with the engine and clutch and is bolted to the bell housing of the fly-wheel. A center control ball and socket joint is located in the cab floor above the transmission gearset and provides an

easy means of shifting the speeds. The low speed gear ratio is 17.55 to one; second, 9.94 to one; high, 5.85 to one and reverse, 20.47 to one.

The drive shaft extends through two enclosed universal joints and the tubular propeller shaft to the pinion in the rear axle system. The rear axle is $\frac{3}{4}$ -floating, fitted with roller bearings. The housing is one-piece pressed steel construction electrically welded, giving great strength and rigidity. The drive shafts may be withdrawn without removing the wheels, allowing ready removal of the drive and differential gears. The front axle is of drop forged I-beam construction cast with integral yokes and nickel steel spindles fitted with tapered roller bearings. The frame is of pressed steel, channel section, with length overall of 184 inches and width of 34 inches, strongly reinforced with cross braces and gusset plates hot riveted to provide the utmost strength. The frame is suspended on semi-elliptic springs of high grade chrome vanadium spring steel, seven leaves in front and 10 leaves in the rear. All shackles are fitted with Alemite lubricator nipples.

NEW VICE PRESIDENTS OF WHITE CO.

Robert W. Woodruff and Mason B. McLaughlin were elected vice presidents of the White Co., Cleveland, O., at a recent meeting of the board of directors.

These two men, with Vice President George F. Russell and James A. Harris, Jr., will constitute a committee in charge of all matters pertaining to sales for the whole country.

Headquarters of the four will be at the Cleveland office, but each man, in addition to his general supervision as a member of the sales committee, will have under his especial charge one particular section of the country.

Mr. Russell will have supervision over the East, Mr. Harris the West, Mr. Woodruff the South and Mr. McLaughlin the central section.

Both of the men just raised to the vice presidency are old White Co. men. Mr. McLaughlin has been manager of the central sales department of the company.

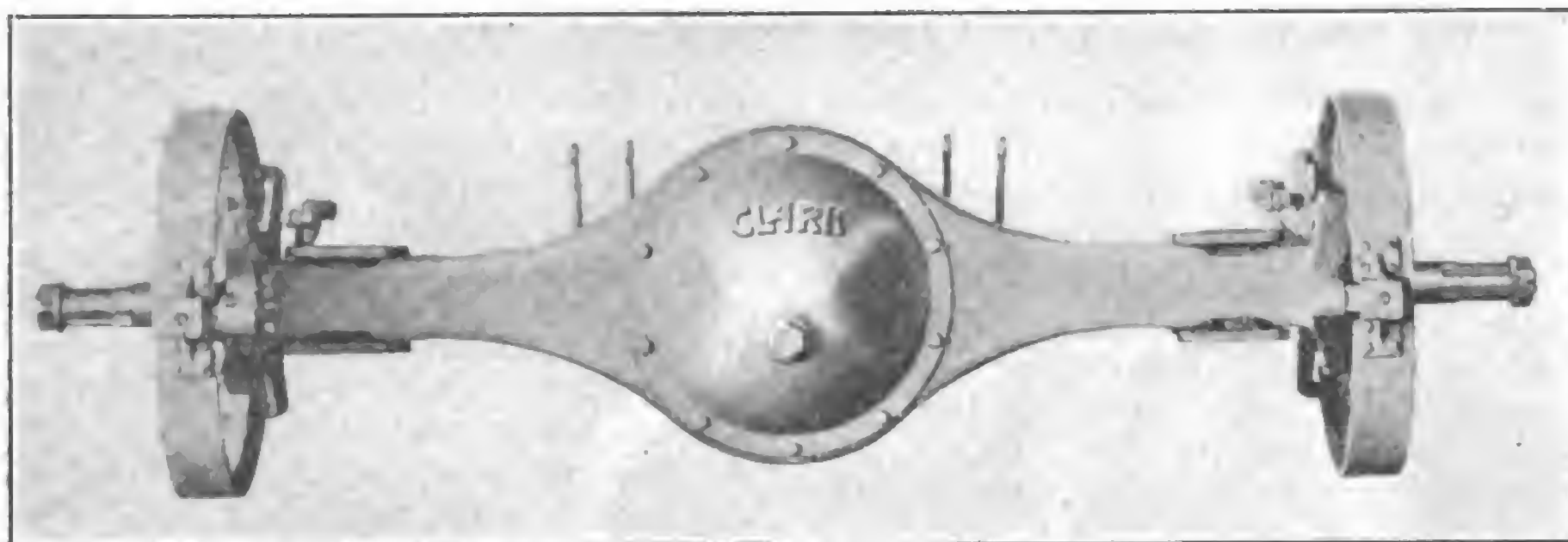
New One-Ton Bevel Gear Axle

Not a Passenger Car Axle, But Designed Especially for One-Ton Light Delivery Service—Ample Braking Surfaces and Large Size Bearings Featured in Axle.

THE new axle designed by the Clark Equipment Co., Buchanan, Mich. for use in the light speed trucks which are being manufactured in ever increasing quantities by nearly all truck manufacturers is especially designed to meet the needs of manufacturers. Production has recently started at the plant in Buchanan, Mich., and it is reported that the axle is in great demand.

expanding type; in fact the same brake assembly is used as on the regular Clark 1½-ton internal gear model.

The wheel bearings are designed to take the thrust in both directions and the bearings are so mounted that the thrust on each wheel is taken care of independently by each bearing rather than transmitting the thrust in the direction of the wheel bearing on the opposite side, which



Large Opening at Rear of Axle Housing Provides Accessibility to Differential Gears, While Unusually Large Brakes and Rugged Axle Construction Place the Clark Axle in the High-Grade Class.

Emphasis is placed by the builders of the axle on the fact that it was designed primarily for truck use and is not a converted passenger car axle. It is of the bevel gear type and takes its place in the Clark axle line as Model B-21.

Special features found in this new axle include an exceedingly short pinion shaft which reduces the overhang of this member approximately 50 per cent. The member is fitted with a straddle mounting, insuring maximum stability and quietness in operation. The entire shaft assembly is mounted on a carrier which is easily disassembled as one unit. The differential is a special Brown-Lipe-Chapin, designed especially for this speed truck axle and is considerably larger than used on other axles of similar capacity.

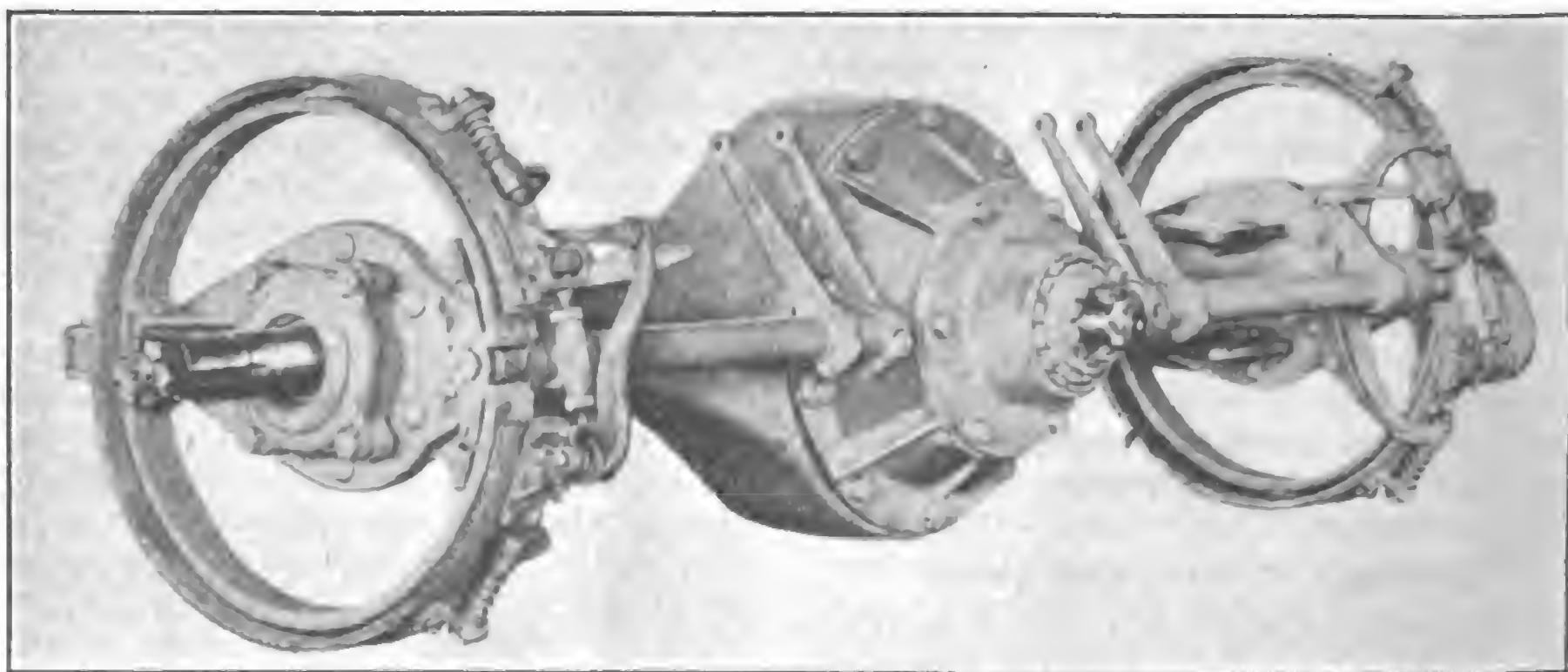
The removable cover plate located at the rear of the differential housing, permits quick and easy access for removal of differential. All standard threads and nuts conform to U. S. standards and S. A. E. specifications.

As large bearings are highly desirable in truck construction, all bearings in this new axle are much larger than necessary to conform to manufacturers' ratings. The axle is known as a semi-floating type.

The drive shafts are of nickel steel, heat treated, splined at both ends and are interchangeable, there being no right or left hand. Drive shafts are made exceptionally large to take strain and stress of high speeds.

Ample brake capacity has been provided through the use of over-size brakes of both external contracting and internal

has been the accepted practise on passenger car axle construction. Taking the thrust in both directions on one wheel bearing is said to eliminate the possible wobble and wheel looseness objectionable in axles with bearings that take the thrust only in one direction. All nuts are thoroughly locked in position with cotter pins, lock rings or positive lock washers. The maximum gear reduction is given as 6.25 to one.



Accessibility to the Driving Pinion and Bearings is Provided Through a Removable Cover at the Front of Clark Axle, and Brake Adjustments Are Easily and Quickly Made from the Outside of Brake Drums.

All materials and workmanship conform to the standards used in Clark internal gear axles which are used extensively as driving units on so many of the high grade trucks.

SPECIFICATIONS CLARK ONE-TON BEVEL GEAR AXLE.

Rear Axle—Model No. "B 21."

Style—Bevel Gear Drive Type.

Weight—(Including Wood Wheel Hubs, Drums and Bearings), 380 Pounds.

Maximum Weight Allowable on Spring Pads—3500 Pounds.

Tread—56".

Gear Reduction—6.25 to One Maximum.

Road Clearance—10½" with 36" Tires.

Spring Centers—38½" to 40" (39½" Standard).

Width Springs—As Specified (21/32" Standard).

Brake Drum—16". Internal 1½" face. External, 2½" Face. Thermoid Brake Lining Used Unless Otherwise Specified.

Drive and Torque—Designed to Be Taken Through Springs, Hotchkiss Drive.

Bevel Gear Set—3.48 Pitch, 1 15/16" Face. Adjustable for Mesh of Teeth.

Ring Gear—44 Teeth, Spiral Teeth.

Bevel Pinion—Seven Teeth Spiral Bevel. Integral with Propeller Shaft.

Drive Shaft—Nickel Steel. Wheel End 2" Diameter. Differential End 1 9/16". Both Splined.

Propeller Shaft—Finish on End 1½" S. A. E. 6 B Spline.

Wheel Bearings—310 Size Double Thrust.

Rear Hub Flange—9" Diameter.

Brake Levers—Both Inside Springs.

Designed for 14 Spoke Wood Wheels.

Bearings—All bearings are of the non-adjustable type. They are much larger than is necessary according to manufacturers' ratings. Large bearings in truck construction are highly desirable. Since all working parts of axles are dependent upon the bearings holding up.

Brake Drum is piloted on rear hub and is readily removable for wear or replacement through bolts which have the nuts on the outside of spoke.

Hard Felt Washers are used throughout the axle to exclude dirt and retain lubrication in the proper places.

Brake Supports are removable from axle.

All Bolts, Nuts, Cap Screws, Etc., are U.

S. standard and may be purchased anywhere. No special thread is used. All thread is right hand except on the external brake turnbuckles.

Wheels are readily removable or replaceable without injury to bearings. They can only be put on one way.

All parts of axle are readily accessible for repair or replacement.

All nuts are thoroughly locked in position with cotter pins, lock rings or positive lock washers.

The Danger in Cost Systems

Few Questions More Vital to Trade Associations Than Government's Attitude Toward Collective Study and Use of Rules for Determining Costs.

UNIFORM cost accounting by trade associations is not only legal, but highly beneficial. This is the personal view of Nelson B. Gaskill, acting chairman of the Federal Trade commission, as expressed, unofficially, to E. W. McCullough, manager of the Fabricated Production Department of the Chamber of Commerce of the United States. The commission heartily favors such work, "provided it is done scientifically and accurately."

Only when cost accounting is used for "ulterior purposes," such as finding averages or otherwise being made the basis of price fixing, is it illegal.

Trade association members have long realized the importance of cost accounting information, and some of them have attempted to deal with the problem from an educational standpoint; but apparently not all of them have restricted their activities to the educational angle, and so have aroused criticism by the Federal Trade commission and the Department of Justice. This has checked the efforts of others who were innocent of wrong-doing. It was to clarify the situation that Mr. McCullough wrote recently to Mr. Gaskill, asking for his opinion regarding uniform cost accounting as used by the producers of a certain line whereby they figured their cost under the same rules, including in them the same elements, and differing only in results because of variance in the size of plants, equipment, efficiency and local conditions. Such a standard plan would be uniform as to fundamentals.

The Commission's Attitude.

In reply Mr. Gaskill said: "There has been much misunderstanding and unfortunately not a little misrepresentation of the attitude of this commission on the subject of uniform methods of cost accounting. In fact it seems to be difficult to secure, even for the most carefully worded statement, a proper appreciation of the commission's position, yet it is really very simple, namely, that it is strongly in favor of such work provided it is done scientifically and accurately and is not used for ulterior purposes in violation of the law.

"No governmental agency in this country, except possibly the Treasury Department, has had so much occasion to observe the existing defects in cost accounting methods, but the commission is glad to record its opinion that there has been, on the whole, a considerable improvement in recent years. The work of this commission would be greatly facilitated by further improvement in cost accounting methods and also, in fact, by a greater uniformity in methods provided proper methods are chosen as the models.

"There has been a good deal of indiffer-

ence and ignorance shown by individual companies regarding the methods of ascertaining costs. Accurate cost finding in some cases, however, appears to involve an expense that some business men regard as greater than the benefits, while in some industries the technical or theoretical difficulties in getting accurate costs are no doubt very great.

"As long as the principles of cost accounting are sound and the methods used are adapted to secure accuracy of individual results, and provided that the results are not used directly or indirectly for ulterior purposes of an illegal character, the Federal Trade commission is in favor of the study and development of uniform cost accounting by trade associations, or otherwise.

"There is evidently nothing illegal in such a practise, but it is always well to remember that though innocent in itself, it has sometimes been perverted to serve the ends of collusive price control, and, when it is so used, no matter whether directly or indirectly, then restraint of trade is involved.

How far may a trade association go in a uniform cost accounting system?

In putting this question to the acting chairman of the Federal Trade commission, the Fabricated Production Department of the National Chamber made this explanation:

"We refer to a standard plan or methods which may be developed and used by the producers of a certain line whereby they figure their costs by the same rules, including in them the same elements and differing only in results because of the variance in size of plants, equipment and local conditions—uniform as to fundamentals.

"Is there any reason why such a system may not be developed and used lawfully by an industry? Again, if conversion costs only be dealt with, is there any legal bar to the collective study of costs by the members of an industry using such a uniform cost system?"

The reply, made unofficially, is that such a collective study is not only permissible, but beneficent so long as no ulterior use of it is intended. At a time when the trade associations are in considerable perplexity as to what course of conduct they may pursue, this clarification of the cost accounting problem should prove extremely helpful.

"With respect to uniform methods of determining conversion costs the same principles and conclusions would also apply."

In elaborating this statement, Mr. Gaskill wrote further a little later: "Stated in another way, the conception of the commission is that the efforts of a trade association to educate the individual member in the application of sound principles of cost accounting in his individual business, are proper. But that any subsequent effort of the association to reduce the individual costs to an average or uniform cost basis and to procure the use of the group standard as a basis of price making by each of the individuals in the group, is improper.

"Applying this statement to your interpretation of our letter of the 25th, it may be said that for a trade association to set up and induce the use by its members of a scientific and accurate plan of cost accounting is not only legal, but highly beneficial to the individual members of the association. The use of this legal and highly beneficial information by each individual in establishing his own production cost and determining his own margin is entirely proper. If thereafter the association attempts to induce its members to disregard their own varying figures and use a common average or uniform figure of cost or margin or both, it has departed from its proper position of instructor and may easily take on the appearance of a price fixing combination in restraint of trade or in suppression of competition.

"How far the association can lawfully go in acting as the medium of exchange of cost data among its members can only be determined after the decision by the United States Supreme Court in the pending action against the American Column and Lumber Co. et al., in which this question is involved.

"In such an expression as this, nothing is 'condemned' by the commission. The commission renders judgment only after the trial of an issue of fact upon a complaint, after hearing. Such letters as this are advisory only, suggestions and nothing more, written in the hope that they may be helpful."

Commenting on this correspondence, Mr. McCullough says: "Believing that the chief function of a trade organization is the education of its members along proper lines, it is apparent that there is no bar, legal or otherwise, to their promoting cost accounting among their members within the restrictions mentioned in the correspondence. But I cannot too strongly emphasize what is also pointed out as to using this valuable information in a way which is clearly unobjectionable."

PERTINENT POINTED

A PROPHECY

SALES of motor trucks in the United States during the second quarter of this year exceeded those of the first quarter of the year, but they are below those of the corresponding period last year. This is shown by a production census made by a New York brokerage house. During the three months ended June 30, truck sales aggregated 18,458, as compared with 13,714 the first three months of 1920. In the second quarter of 1920 sales aggregated 46,982 trucks, as compared with 45,230 in the first period of that year. For the first six months of 1921 total sales amounted to 32,170 trucks, as against 92,212 in the previous year. The figures in all cases are exclusive of Ford production. This evidence on the face of it is somewhat calculated to make the interested person wonder, "What is going to bring back business to the truck factories?"

THERE are two sides to this question. One is whether or not 1920 can be considered as a normal year. That in itself is a matter for the motor truck interests to decide until such time as established facts settle the question. In this writer's opinion, figuring the matter from all angles, and more especially giving thought to the rapidly increasing efficiency of the motor truck, 1920 was a normal year, although it was somewhat anticipatory due to the forcing influence of immediate post-war prosperity. To elucidate: The motor truck industry was given a rapid impetus by the war. This was due to the great demand for quick transportation, and the commercial vehicle, because of its great efficiency, undoubtedly came to be recognized as a wonderful attribute to modern civilization many years before it would have, had there been no war to exploit it. Now that it has shown its marked value in the transportation field, the public will be loth to let it go, and it only remains for business to again get going properly, at which time the motor truck factories will again have all the work they can comfortably handle. There are probably more uses to which the motor truck will be put than even the manufacturers themselves have thought of. One of the greatest fields for its development is seen in the transportation of people, and the trolley interests are beginning to feel such competition in a very marked way. The bus business looms large, and already the men behind the plants are beginning to prepare for a new market which the present outlook visions as one of great potentiality. This is reflected in reports from various parts of the country of traction difficulties that are being relieved by the busses. It is not to be implied that the trolley interests run a chance of becoming obsolete. No system of transportation has ever become entirely obsolete. This is proven by the fact that throughout different countries people are still being transported by

men, horses, oxen, and in every single way that was ever devised. Thus it would not be wise to say that the success of the motor truck in the trolley field preludes the scrapping of the trolley. Rather, it might be better to prognosticate that the bus will take over the interurban service to a marked extent and thus serve as a feeder to the trolley systems, although, with the constant change that ever marks the advance of modern civilization, it almost appears certain that modern traction systems, because of their very great expense of operation, will be relegated to the place where they will handle but very little of the transportation business. The United States is going to use a lot of busses within the next few years. This much is certain and portends a pregnant prophecy; one which if true will do much to put the truck factories back on to a production basis that will make 1920 appear as an "off year." Briefly it is this: There are not enough truck factories in the country to supply the demand for passenger busses alone, once that demand becomes general. This may be a somewhat hazardous opinion at first glance, but a careful study of the facts shows that it is true, and this writer predicts that future developments will confirm as a fact that which now appears as a somewhat liberal prophecy.

LOADOMETER DETECTS OVERLOADS.

BECAUSE of the many flagrant cases of overloaded motor trucks on the highways of Massachusetts, state inspectors are applying a "loadometer" to assist them in enforcing the law.

Unfortunately, it appears that mere comment alone does nothing to assist in correcting the growing evil of overloading. It certainly is hard on the truck manufacturer, to say the least, and one would think it equally hard on the owners, though they seem not to care.

COMMENT OF THE DAY

POWER DRIVEN FARMS.

AN INTIMATE friend, a former horse dealer if you must know the truth, has recently decided that he will spend the declining years of his life on the old home farm. His decision, partly formed two years ago, has been strengthened by a recent visit to the town of his birth, and he has already started workmen on the job of getting the buildings into shape and generally renovating the place.

Nothing elaborate is planned, as this man who spent the first 18 years of his life with the cows and chickens, plans to be a hard working, self-supporting farmer and not one of those "agriculturists" who wear knickerbockers. It'll be the overalls for him and he won't wear them out at the seat either.

But what I started to say was this—he has already bought his truck and is learning to run it. That was one of the first things he did. I asked him how it was that he, who was always a believer in the old time farm horse, should have changed his mind so easily. His answer was interesting. He said, in effect, that the only farms that were making more than a living wage for their owners were those on which the labor problem had been reduced to nil. No hired men were employed and no costly horse flesh stood in the barn to eat 365 days a year and work 90.

"I've heard the same thing said myself," I told him, "but how do you know that it is the actual fact? You haven't had any experience," I said. His answer was illuminating. "But my intimate friends have. I've been back home and talked with the farmers that I used to know as a boy and they told me, which to me is the same as personal experience." And that was good enough for me, too.

More and more I find that the progressive American of today—and the term embraces all forward-looking persons in this country—is unanimous in recognizing the automobile, the motor truck and the tractor as distinct attributes to general prosperity. Certainly this is true of the farmer. It is actually an unusual occurrence to find one who does not own at least one of the three types of machines and a great many agriculturists have wholly dispensed with the horse.

The automobile in a large sense does the work of a light truck in hauling fruit, vegetables and farm products to the market. The truck is used for the heavier work. It saves the loss of time for

one or more men as well as at least two pairs of horses.

The tractor pulls two or more plows twice as fast as any span of horses could possibly draw one plow. The same tractor draws one, two or three loaded wagons over the highways to and from market with greater speed than horses could possibly make. The tractor carries wheat harvests with twice the speed attained by horses and without the great fatigue to the animals. It plows the fields and harrows them at the same time, saving half the actual cost of getting the land ready to sow to wheat, oats, corn and other crops. All of this is money saved by reason of the use of modern inventions. It is possible, through the gasoline motor, to have running water and lights in every rural home. Pumping water for stock and for irrigating purposes, the small truck for the local markets, and the automobile—all are factors which bring actual money to those with the enterprise and energy to install and operate gasoline-driven motors on their home farms. The comfort of living is greatly enhanced, while the cost is not increased because of the saving motor power makes in doing work.

GASOLINE VS. H. C. L.

THE recent reduction in the price of gasoline, the greatest general price cut made by the Standard Oil Co. in 18 years, constituted the first important shot in a trade war against independent companies. A three-cent reduction was made effective in Indiana, Illinois, Minnesota, Michigan, Wisconsin, Iowa, North Dakota and South Dakota, while a cut of four cents was announced in Kansas, Missouri and a part of Oklahoma. It is usually the practise to make price fluctuations uniform in the various states served by the Standard Oil Co. of Indiana, but in this case a reduction of an extra cent in Kansas, Missouri and Oklahoma was ordered because of keen competition with independent companies. The Texas Co. immediately met the Standard's prices in the Chicago market, and it is probable that eastern refineries will follow the lead of the Indiana corporation. The probability of this was reflected in general market conditions, crude showing a strong trend until the price cut was announced. In the meantime the users stand on the side lines and applaud vigorously, trusting that this opening skirmish preludes a lengthy battle, but this publication is willing to make a gentleman's wager that such will not be the case.

TRUCK TALK

CONTAINER CARS.

THE latest transportation equipment is the container car. It has been tried out by the New York Central railroad between New York, Cleveland and Chicago, and is certain to spread to other shipping centers which constantly exchange commodities.

The mission of the container car is to expedite delivery of less than carload volumes of freight from shipper to consignee. Its use calls for coordination of carriers—steam railroads, motor trucks and electric railways.

Vault-like compartments, built to occupy one-third or one-sixth the floor space of a 50-foot freight container car, or one-ninth the floor space of a 60-foot express car, are loaded at the warehouse of shippers, transported by motor trucks to the railroad yards; there lifted by crane to the freight or express car and secured by hooks and steel guides for the next stage of the journey. Arrived at their destination, the compartments are again lifted by crane to motor trucks, rushed to the doors of consignees, unloaded and then returned to the railroad cars, either light or reloaded.

Time saving at every stage is the primary object of the container car system of store-door delivery. First of all, exponents of the system point out, time is saved at the shipping point because the elimination of rehandling between shipping and receiving points makes costly crating of products unnecessary. The elimination of rehandling and checking makes necessary the services of fewer truckmen and clerks, and the immediate unloading of goods at store doors eliminates the item of demurrage, at the same time promptly releasing freight cars, clearing yard tracks of idle cars and reducing congestion at freight station platforms.

AN IMPORTANT MATTER.

THE GRAHAM resolution providing a 90 per cent. ad valorem duty on the original value of all military and naval supplies of any kind whatsoever, including motor cars and trucks, exported prior to Feb. 11, 1919, from the United States for the use of the American Expeditionary Forces or the countries associated with the gov-

ernment of the United States in the war with Germany and Austria, and thereafter sold to any foreign government or private individuals or associations, passed the House Aug. 11.

The resolution was then referred to the Senate committee on finance, which reported it favorably to the Senate Aug. 22, with an amendment that the provisions of the resolution should not apply to those goods purchased prior to Aug. 15 and exported to this country prior to Nov. 1, 1921, if such purchases are certified to by the United States consul and if a certified copy of the instrument of purchase is filed within 45 days after the approval of the resolution with the secretary of the United States Treasury and United States consul.

Objection by Senator Pomerene of Ohio to the unanimous consent necessary for consideration prevented the passage of the measure before the recess. It now goes over on the calendar to the period following the recess, or some time later in September.

According to experts thoroughly familiar with procedure, the favorable report of this resolution by the Senate committee will serve as constructive notice to all purchasers of these goods that any purchases made after Aug. 15 shall be subject to this duty. It is further believed that the amendment of the Senate is likely to be stricken out altogether because of the later time set for consideration of the bill.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, suggests that those who believe in the principles of this resolution get in touch with their senators during the recess, urging its passage without the amendment.

BETTER SIGN POSTS.

WHILE many states are to be congratulated on the manner in which traffic rules are enforced and roads attended to, there is, nevertheless, hardly a single one of them that is paying proper attention to the sign board laws. In the case of the state highways, many are marked, in better or worse manner, but few of the side roads are sign-posted, and in many instances where the work has been done, are so carelessly marked as to be distinctly misleading. The majority of the

boards are old and faded, illegible through wear, and very frequently the branches of adjacent trees have grown out and covered them.

One eastern state has had 11 serious accidents within two months at a certain intersection of a state and county highway. The authorities in every case laconically stated that "the foliage of the trees had obscured the sign board," and did nothing about it until the matter was taken up by an automobile organization. The law in many states covering this matter is well established and needs but a little pressure from the right source. The local truck organization could probably handle this proposition in a way to benefit all concerned. A little effort will save accidents, and it will also save the stranger driving a good many miles out of his way when he is away from home and cannot rely wholly on his sense of direction to reach his objective. Why not get busy this fall?

THE BUILDER.

MOTOR trucks don't destroy highways. They build them. That's the gospel truth. Certainly it is proven by the gigantic road-building programme recently undertaken throughout the entire country. These roads are being built by thinking men who do their figuring from the viewpoint of profit and loss. They know that good, substantial highways are investments that pay big dividends in the promotion of general prosperity.

The business life of this great Union depends wholly on the prosperity of its commercial, industrial and agricultural interests, and those forward-looking states that have already materially recognized the tremendous part that the motor truck plays in the daily life of their industries have gone far toward laying the foundation of a prosperous future. Give the motor truck good roads and see how quickly you get your money back by cheaper and more efficient transportation. Motor trucks destroy the roads? Puerile reasoning, and not the truth.

THE NATION'S FOOD.

IT IS very probable that the average consumer of farm products never pauses to give thought to the part that the swiftly-moving motor truck plays in supplying the nation's food. A visit to the wholesale markets of the larger cities at an early morning hour is impressive and gives one a good idea of just how important the commercial vehicle has become in the supplying of fresh edibles from the outlying farm districts. Great loads of green vegetables, wet with dew, are being carted into huge warehouses or ranged

along the sidewalk markets ready for the retail buyers. Motor vans loaded with milk and cream, also contribute a colorful bit to the general hustle and bustle of the market place.

But these represent only the final stage of the transportation of food stuffs to the market. The early morning hours at the farm tell the big story and exemplify in no uncertain way the great benefit to the agricultural industry that the motor truck has been. For instance: In the days of horse-drawn transportation the farmer who would be first to market must frequently tumble out of bed at 2 o'clock in the morning, load his truck wagon after waiting for his horses to eat and set out on the long jaunt to town, thus spending half of his time on the road. Furthermore, if he arrived late his garden stuff sold at a low price, for there is no stronger competition in any business than in the raising of produce for the city market. "First to market is first sold," and the forward-looking farmer—he who is in the business for all he can get out of it—knows this and thanks his motor truck for getting him there on time without spending the entire night on the journey. He doesn't have to spend half of his life "following a horse's tail."

TRUCK DUMPS.

ACCORDING to a report from Power Farming Bureau, the number of power farmers who are using mechanical power not only for field operations, but for other hauling jobs, is becoming so great that country elevators are finding it necessary to install dumps which will admit of the dumping of grain from motor trucks. The builders of new elevators recognize the tendency of the times and are making their initial installation to satisfy the requirements. Many farmers who own motor trucks are prevented from using them for hauling grain because of the insufficient dumping facilities at the old elevators to which they deliver the grain.

WITHOUT PREJUDICE.

IN MANY sections of the United States railroad managers complain of the increasing diversion of short-haul traffic to the motor truck. In New England the officials of one railroad company estimates that it loses \$2,000,000 a year in freight revenue in the shoe industry alone as a direct result of motor truck competition. Two small branch lines near Boston are said to have been abandoned by reason of inability to meet such competition. It may be confidently expected that the use of the motor truck in short-haul competition with the railroads will steadily increase.

Methods of Final Drive in Everyday Use

Engineers Disagree as to Which Is Best—Simplest Construction Which Stands Unlimited Abuse Is Ideal Sought—Hotchkiss Drive Popular with Many Manufacturers.

“MANY men of many minds,” says the old adage and the mechanical writer who earns his daily wage by studying the pros and cons of the automotive industry is one who sees the wisdom of the old maxim. He is forced sometimes against his will to believe that all methods are best and frequently sees evidence that almost cause him to think that this is so. Take the matter of drive for instance. There are three separate and distinct types. One may be superior to the other, yet the user of each stoutly maintains his own choice to be the only one that is correct in principle and operation. Without taking sides on the matter, which necessarily must resolve itself into a straight case of preference, let us study the three and form our individual opinions, laying stress on the Hotchkiss principle for this paper, and going into detail on the others at some future writing.

THE torsion rod drive may be composed of one rod located parallel with the propellor shaft and a short distance from it, or two rods, located one at each side of the frame, fastened to the frame at one end by means of a hinged or ball and socket joint, and to the axle housing at the other end, either by means of a hinged joint or a ball and socket joint.

The torque tube is the second method of drive and consists of a housing which covers and protects the propellor shaft fastened rigid to the axle housing at the rear end and swiveled to the rear of the transmission housing at the front to allow for angularity of drive and to compensate for spring action.

The Hotchkiss drive does not use rods between the center of the chassis and the rear axle housing, but depends entirely upon the spring leaves, hangers and

dency of the axle to turn over backward with the same force that is exerted on the bevel ring. This tendency of the axle housing to turn over, due to the action of the propellor shaft, is greater when the car is being started, or when the car suddenly runs into sand or mud, where the resistance to be overcome is greater. This twisting action or torque must be taken care of in some manner in order to prevent the axle housing from turning over.

It should be understood that whenever the torque is taken by a torque tube, by torsion rods or a torque arm, that these members assist materially in driving the car, as one end is attached to the frame of the car and the other to the rear axle housing.

In early type passenger cars and trucks and in many of the later vehicles manufactured by old line companies who

Torsion Rod Drive.

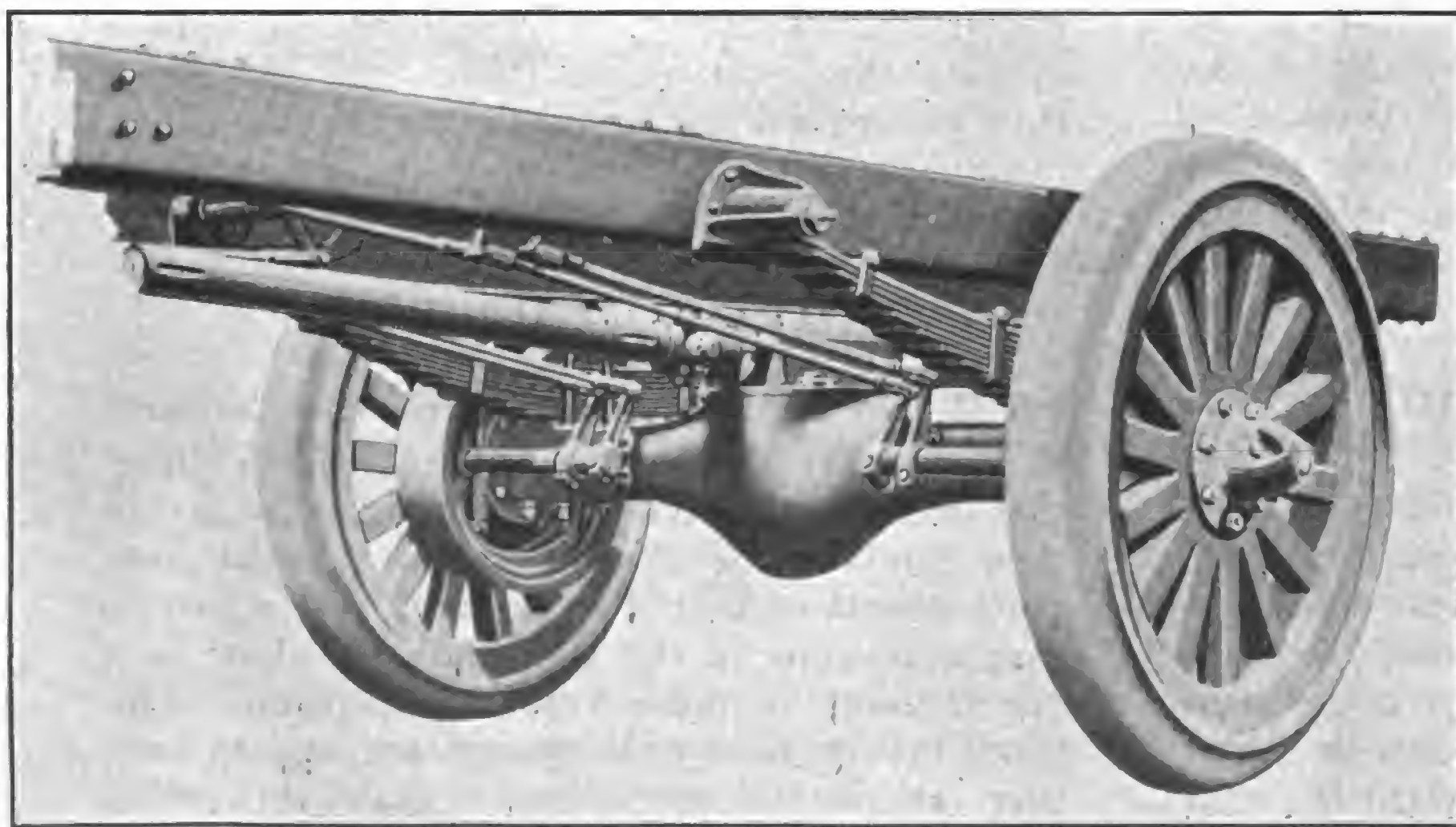
Torsion rods are used extensively on large capacity motor trucks of heavy duty type, especially those of capacities ranging from 3½ tons and up. The reason for this is because of the heavier carrying capacities of the trucks, the torque exerted on the rear axle is greater and as many of these trucks are equipped with worm or double reduction drive gears, the torque or turning force exerted is increased over the strain exerted in lighter vehicles. Trucks of large capacity are still in many instances equipped with sprocket and chain drive. Torsion rods are a necessity with these trucks and the rods are arranged with threaded ends, which allow for taking up the slack which is bound to occur through the chains stretching.

Torque Tube.

Torque tubes have been used exclusively with certain cars for a number of years and to all appearances have solved the twisting strains of the rear axle satisfactorily, and many still continue to use the torque tube and no trouble whatsoever is found with the system so far as the writer has knowledge.

The torque tube as used on certain popular cars consists of a cast steel housing, which covers the propellor shaft from the differential housing to a point just in the rear of the transmission. The upper end of the tube is supported either to the cross frame at the rear or to the transmission housing by means of a yoke or forked end, which is held in position on the housing or cross frame by means of two hinged joints, one at each side, pivoting the yoke and allowing the torque tube and the axle housing to follow the inequalities of the road. The angularity of the propellor shaft is taken care of by means of a universal joint in the open space between the yoke ends, as the universal joint is covered, it is thus protected from outside dust and retains oil for lubrication.

This method of drive is said to thoroughly care for the twisting strain of the axle and meet all conditions of driv-



Flexibility Features in Hotchkiss Drive—Large Springs and Spring Brackets Provide Unusual Strength for Rear Axle Torque.

spring pads to care for the twisting strain exerted upon the rear axle by the driving and driven gears and in braking.

The definition of torque in theory is similar to braking torque and is the ten-

have been in the business for years, the torsion or torque rod is still in use. This method has successfully withstood the test of time and evidently they see no need of changing to other methods.

ing. It is simple in construction, not likely to get out of order, and positive in action. When it is desired to disassemble the axle and housing the torque tube is quickly unbolted at the rear end, leaving the axle housing and axle free for further disassembling.

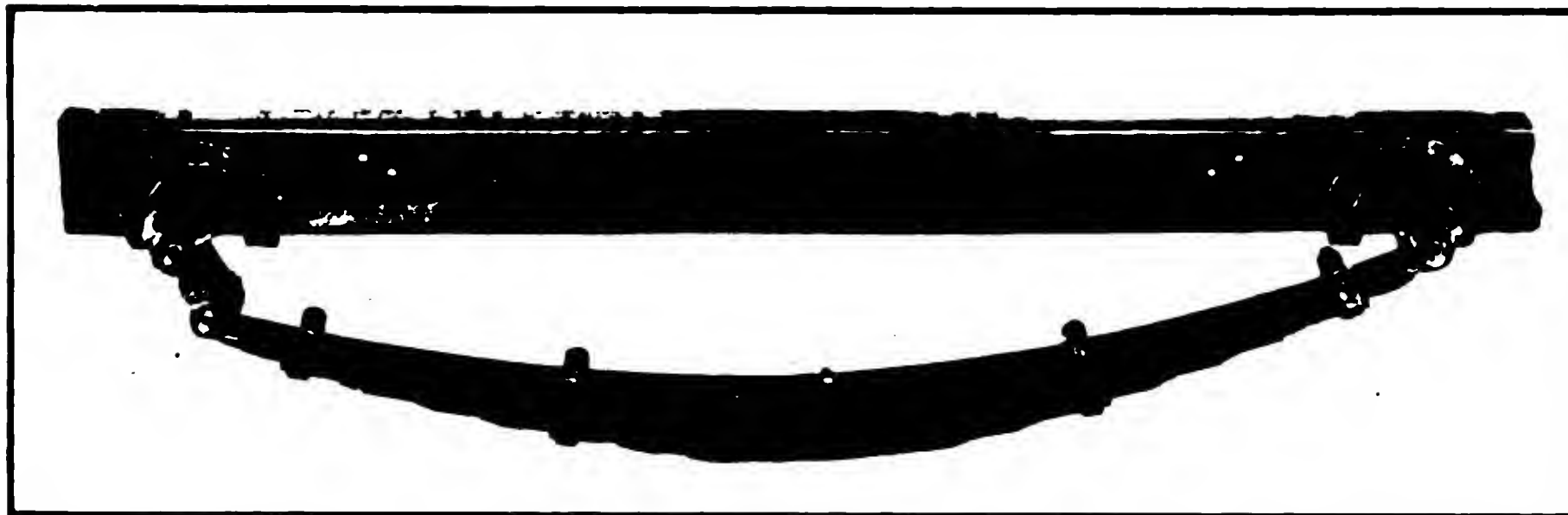
Hotchkiss Drive.

The latest and most recent drive to be adopted generally by manufacturers is the Hotchkiss drive. This method eliminates the use of torsion rods, torque tube and torque arm. In their stead the springs and spring hangers are called upon to care for the twisting strain of the axle and housing.

Evidence that this method is thoroughly successful is clearly indicated by the great number of passenger car and truck manufacturers who have adopted it as a regular feature. Predictions were freely made when the method was first introduced that the method would not handle the torque strain. It has now been in successful use for several years and the writer has yet to hear of a single instance where this method has not made good when the stresses were proportioned correctly for the drive.

There are five fundamental shocks and strains to which all vehicles are subject: Load stresses, road strains, road shocks, driving shocks and strains, braking shocks and strains.

Load stresses and driving or torque strains occupy first place in the consideration of torque as the former are carried by the springs and the second occurs in the driving line between the engine and



Long Flat Springs of Semi-Elliptic Type Feature Hotchkiss Drive Method of Caring for Rear Axle Torque.

there is a tendency of the axle to turn backwards, while the application of the brake tends to turn the axle forward.

In the Hotchkiss drive these tendencies are resisted by the springs, but, since the springs are flexible, a certain amount of rotation is permitted. One can easily demonstrate the results as indicated by suddenly engaging the clutch or applying the brakes.

As opposed to the Hotchkiss drive there are other constructions in which movement of the axle is limited by radius rods, and rotation of the axle is prevented by torque arms.

In these very widely differing constructions the position of the axle is absolutely fixed, so that attempting to start a vehicle which is designed in this manner is practically the same as attempting to start a heavy freight train in which there is no slack.

It is particularly necessary to take the torque reaction through the springs.

TRAVELLING EXPENSES MUST COME DOWN.

The high cost of distribution is a big factor in the present prices for merchandise and this has been materially increased in the past several years because of the high cost of selling. Hotel expenses and transportation are big items in this cost, as may be seen from the following figures that have been gathered by the American Society of Sales Executives:

Approximately 600,000 men spend a large part of their time travelling for commercial purposes, spending, on an average, 200 days each year away from home. Their average expenditure is estimated at \$4.50 per day for lodging and meals and \$3 per day for transportation. This makes an average annual expenditure per man of \$900 for lodging and meals and \$600 for transportation and rolls up the enormous totals of \$540,000,000 hotel bills and \$360,000,000 railroad and auto hire paid out by the travelling fraternity each year.

With this tremendous travel bill for business to shoulder, Fowler Manning, chairman of the American Society of Sales Executives, asks what is the situation?

The iron and steel industry is operating at 20 to 30 per cent. capacity. The buying power of the farmer has been cut in half. Manufacturing operations, as a whole, are less than half of normal.

Where there is good business it has been, as a rule, due to intensive sales work, emphasizing the point that what is needed to bring about a general business revival is more selling effort, whereas many salesmen have been taken off the road because of the high cost of operating them.

A glance at the figures shown above, says Mr. Manning, is sufficient to bring home to hotel men the fact that for them to be prosperous, travelling men must be kept on the road, and that it is up to them to do their part toward improving general business conditions by reducing their rates so that the men can be kept on the road.

Hotel men say that they cannot reduce their rates—that they did not go up in proportion to other things—and that their expenses have not come down appreciably. As to their first point, where now are the dollar, dollar and a half and two dollar rooms? Where is the five-cent cup of coffee or the slab of pie that used to sell for a nickel? Gone—gone the way all other commodities have gone during the past few profiteering years.



Wide Axle Housing Provides Spring Seat and Extra Large Spring Clips and Bed Plates Are Used with Hotchkiss Drive to Assure Ample Strength Under All Operating Conditions.

the rear tires of the machine.

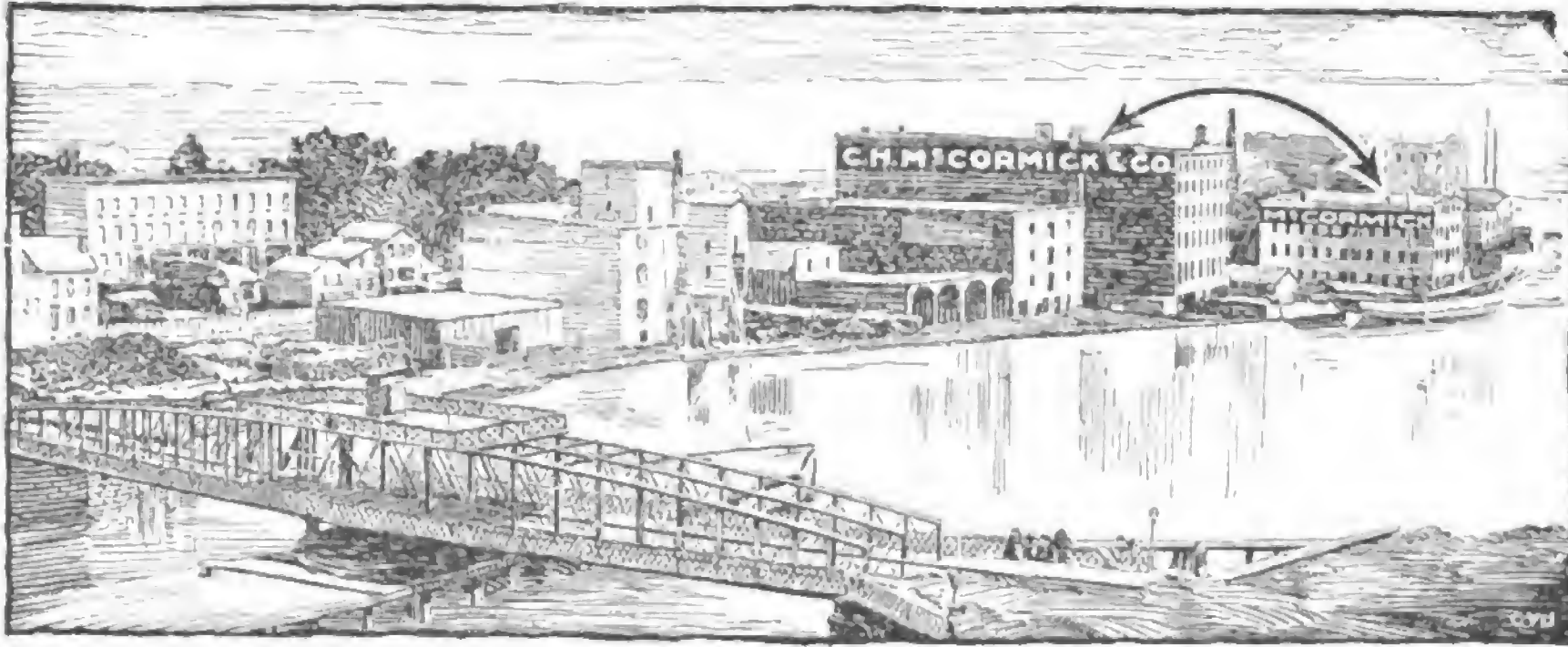
In the Hotchkiss drive the truck is pushed by the rear wheels through the rear axle and springs. Due to the flexibility of the spring, the axle is permitted a slight forward and backward movement, so that the shocks caused by the inequalities in the road are to a certain extent smoothed out through the springs before being passed on to the vehicle.

Another important advantage of the Hotchkiss drive is that the torque of the rear axle housing is absorbed through the springs.

To quote the text books—"Action and reaction are equal in amount and opposite in direction." Consequently, whenever the power from the engine is applied

There is, however, a logical division of types. Trucks of $3\frac{1}{2}$ tons capacity or over, for instance, may be classified as heavy duty trucks. In this class speed is relatively slow and the loads are heavy. Trucks of $2\frac{1}{2}$ tons capacity and under may be classified as general utility vehicles and require a somewhat different design, owing to the difference in operating conditions, in which greater speed and quick manoeuvring ability are more prominent factors.

The marked difference in construction of the two types and the classes of service account for the fact that on heavy duty trucks radius rods are used to take the drive thrust, although even in these the torque is taken through the springs.



McCormick's Reaper Works on the Chicago River Before the Disastrous Chicago Fire of 1871. McCormick Was 62 Years of Age at the Time the Fire Left His Plant in Ruins, and His First Thought Was to Retire, but Mrs. McCormick, Who Is Still Living Today, Urged Her Husband to Build Again at Once, Saying She Did Not Want Her Son to Grow Up in Idleness, but That She Wanted "Him to Work as a Useful Citizen and a True American." So Was Passed the Greatest Crisis in What Is Today the Largest Farm Machine Factory in the World. It Has a Floor Space of Almost 4,000,000 Square Feet, Employs as High as 9000 Men and Women and Can Produce a Total of 1350 Machines a Day, or One Complete Farm Machine Every 30 Seconds.

Reaching Back Into History

AT Chicago's Pageant of Progress, July 30 to Aug. 14, participated in by Illinois, surrounding states and the government, on the \$5,000,000 Municipal pier reaching 3000 feet into Lake Michigan, the International Harvester Co. made an exhibit of farm machines which reached far back into history. The exhibit was one of the largest of its kind, the Harvester Co. believing it important that the millions of city people who attended should appreciate something of their dependence upon the soil and the man who tills it.

Beginning with fundamentals, the Harvester Co. showed two old plows with which the soil was prepared for seeding generations ago. One of these old plows, made 125 to 150 years ago, with a mould board of wood, showed that the village blacksmith or local plow maker contributed to agricultural advancement in that early day. Upon looking at this old plow anyone acquainted with present-day farming operations could instantly appreciate the progress modern civilized man has made in breaking open and stirring the soil. By the side of this ancient and antique plowing device was shown the oldest steel plow in existence, so far as is known, which was made in the early historical beginning of the present P & O line of plows. This old plow was made in 1847 by Thomas M. Stevenson for William Parlin of Canton, Ill. Parlin was one of the founders of the P & O line and this first old plow was fashioned with hammer and anvil by one of his workmen. It will be remembered that the steel plow was received with great misgivings by the farmers, many of them fearing that it would poison the soil, but with it a man could plow more land and really turn the soil over into furrows.

For contrast by the side of those old plows was shown the latest P & O Little Genius two-bottom tractor gang hitched to the International 8-16 tractor all ready to go. It was made plain to the visitors that with this tractor plow one man riding across the field is able to plow as much land as at least three farmers and three teams of horses walking up and down could plow in the old days, and this is the smallest of modern tractor plows.

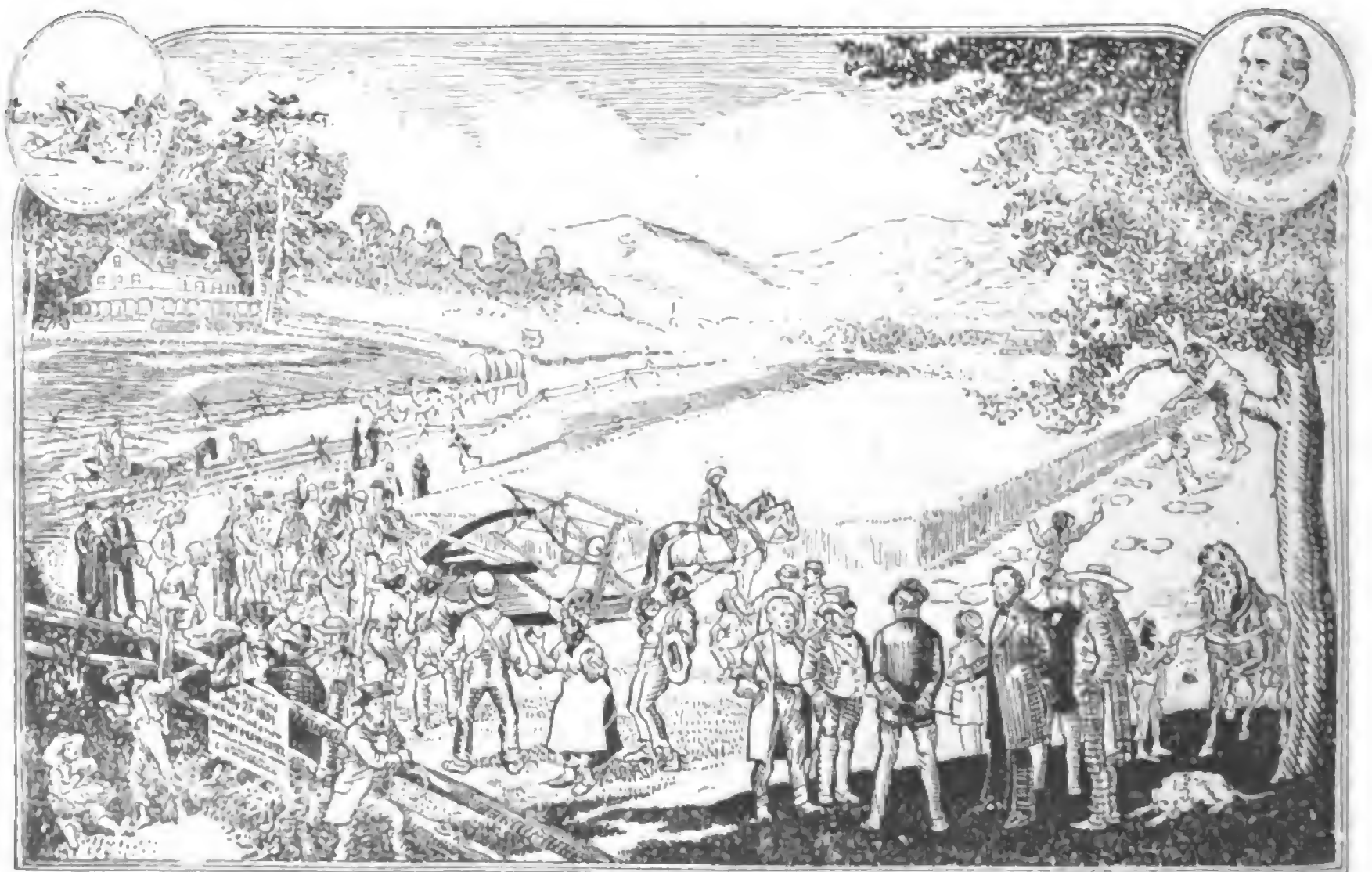
When it comes to harvesting machinery the history of the International

Harvester Co. and of the City of Chicago blend for a time and become one. It was in 1831 that Cyrus H. McCormick invented the reaper and in 1847, after having battled for 15 years to interest the farmers of that day in his revolutionary machine, he went to Chicago convinced that here was the hub for his future industry. He found a 10-year-old city built in a swamp without railway or canal, but he found it busy and hustling, trading wheat for lumber and furs for iron. He went in partnership with William B. Ogden, Chicago's first mayor, built a reaper works on the Chicago river and by 1851 had bought Mr Ogden out and was making a thousand reapers a year.

An old reaper was shown which was not unused to exhibition. It was the type which Cyrus H. McCormick took to the first World's fair held in London in 1851 and with which he received the Council medal for exhibiting "the most wonderful article contributed to this exhibition." It was the exact reaper that was shown at the World's fair in San Francisco, and here it returned to its birthplace to show what Chicago did in a manufacturing way for the cause of agriculture in that early day.

Side by side with this old reaper, which

in its day took half the stooping toil out of harvest and started process of releasing men from agriculture for other industries, was shown an International combined harvester-thresher—the most modern mechanism for harvesting grain. With this machine two men and a tractor can harvest 20 acres a day, threshing the wheat and bagging it all at the same time as the machine goes through the field. We can grasp the significance of this machine when we understand that the agricultural, industrial and financial world can go ahead only as progress is insured by a reliable supply of food and when we understand that the wheat harvest—the principal bread ration of the world—ripens quickly and in the average climate must be harvested within a few days. With the old cradle, the world's harvest was limited by the number of able-bodied men who could be found to swing cradles in the field. In that day the great majority of the population had to remain on the farm close to the food supply, it being possible to spare only a few to live in cities and towns. The invention of the reaper enlarged the acreage which each farmer could care for and automatically increased the food supply in proportion to the population.

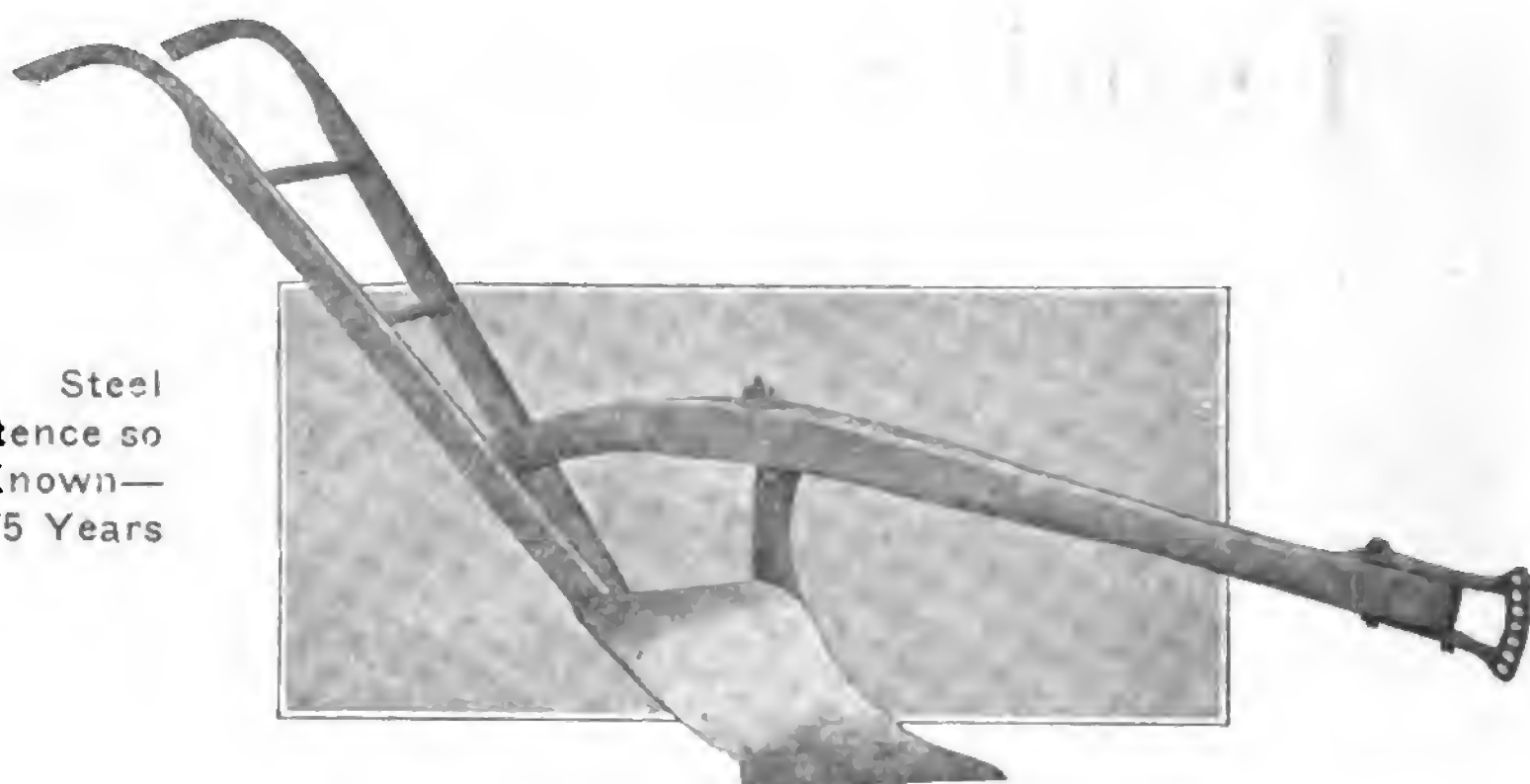


A Pen and Ink Drawing from an Old Lithograph Made a Great Many Years Ago in Commemoration of McCormick's First Public Demonstration of His Reaper in the Year 1831.

The combined harvester-thresher is a symbol of modern life because with it two men can harvest and thresh 20 acres of grain a day and do so by the control of machinery without the stooping, heavy, physical toil with which many had to do the same work before. The International harvester-thresher is a fitting representative of the many machines which have furnished men and women to found cities and the myriads of enterprises which make up modern civilized life.

As the harvest follows plowing and sowing so transportation must follow the harvest. While there are 350,000 miles of railway in America, there are 2,500,000 miles of highways and it is over these that the bulk of our commerce originates and over which it must first be borne to the market or shipping point. In order to do justice to the importance of transportation, the International Harvester Co. showed in the midst of its modern and ancient exhibit three International motor trucks with which the farmer may start the world's food supply on its way. It exhibited its 1500-pound

The Oldest Steel Plow in Existence so Far as Is Known—Made 74 or 75 Years Ago.



speed truck for high speed and quick delivery, its 6000-pound heavy-duty truck, suitable for the heaviest loads originating on the farm, for climbing hills and pulling through the mud, and also its 10,000-pound truck—a monster of highway traffic capable of pulling loads undreamed of at the time the reaper and the old plows were the order of the day. These motor

trucks are the products of two factories in Springfield and Akron, O., and another exclusive motor truck plant which will be the largest in the world is in course of construction at Fort Wayne, Ind. A sizeable proportion of this great output of motor trucks is used on the farms, which shows the importance of rural transportation in the modern world.

ACETYLENE HEAD LIGHT IS LEGAL.

According to New Ruling of Massachusetts Motor Registrar, Few Changes Are Required to Conform to Law.

BOSTON, MASS., Sept. 15.—A new interpretation of the recently adopted motor vehicle light law in Massachusetts, made by Frank A. Goodwin, registrar of vehicles, is stated to have taken a great load off the shoulders of motor truck operators of the state. This ruling reads as follows:

Acting in pursuance of Section 7 of Chapter 90 of the General Laws as amended, acetylene lamps equipped with six-inch mirrors, 5/8 foot burners and plain glass fronts are hereby temporarily approved as devices designed to prevent glaring rays for use on any motor vehicle upon the ways of this Commonwealth, until a study of acetylene head lighting now being made is completed and further action taken by the registrar.

This removes no end of difficulty for motor truck owners, as it makes possible the continuance of the use of the present equipment on the majority of trucks on the highways of the Commonwealth.

It saves a needless expense of money and will not interfere whatever with the work of the transportation companies using motor trucks. The majority of motor trucks are equipped with acetylene head lights and should the original ruling not have been somewhat modified there is no question that no end of confusion and trouble would have resulted. It is generally admitted that electric lighting systems cannot be used advantageously on heavily loaded motor trucks, as the excessive vibration has a decided tendency to destroy the filaments in the lamps and when the question of dimming head lights came up and this fact was brought to the attention of the motor registrar's department, the ruling above was secured.

The five-eighths foot burner gives the

21-candle power required, which is sufficient light to illuminate objects 160 feet from the vehicle and, equipped with plain glass fronts, will not throw a dangerous glare in the eyes of approaching drivers.

The regulations of the registrar require that acetylene lamps be in good order, with mirrors polished. This means that users of acetylene lamps will not be obliged to change their equipment except to comply with the above.

This ruling is virtually an indorsement of the present gas lighting systems on motor trucks, the only change that it necessitates being so slight as to be almost negligent.

Oil lights for head lights are prohibited. They can, of course, be used for side lights, but oil lights in the main have been discarded by the manufacturers.

INTERNATIONAL EQUIPPING CANADIAN PLANT.

As the demand for International products in Canada now warrants their manufacture in the Dominion, it is reported that the International Harvester Co. of Canada is equipping a wagon and sleigh plant it has acquired at Chatham, Ont., to take over the manufacture of International motor trucks which have hitherto been made in the United States and shipped to Canada.

QUARTERLY REPORT OF INTERNATIONAL TRUCK.

The International Motor Truck Co., New York City, reports that for the three months ending June 30, the net profits were \$523,638 compared with a net income of \$4395 in the first quarter of the year. The general balance sheet, June 30, 1921, shows \$3,464,000 cash compared with \$3,125,000 at the close of 1920. Accounts and notes receivable were \$5,000,000 against \$2,472,000 and inventories \$12,013,000 compared with \$15,588,000. On the liability side accounts payable were carried at \$1,005,258 against \$1,663,000.

PROTECTION OF TRUCK OWNERS IS PLANNED.

Organization of State-Wide Effect Is Formed—To Watch Legislation.

INDIANAPOLIS, IND., Sept. 15.—An organization, which will have as its purpose the protection of motor truck owners in Indiana in the making of new laws by the state Legislature and in orders for new roads and city streets by the state highway department and boards of works in Indiana cities, was formed Thursday night at a meeting in the Chamber of Commerce building. Fifteen state industries interested in legislation pertaining to the regulation and taxation of motor trucks were represented. It was emphasized that the organization is the only one in the state which has as its object the protection of all motor truck operators. Other organizations of transfer interests and heavy hauling concerns have been formed previously, but they worked only in the interest of certain lines.

Joseph G. Hayes of Indianapolis was elected chairman of the organization, and Tom Snyder, secretary of the Indianapolis Transfer association, was elected secretary. A committee to draw up the constitution and by-laws was named as follows: Mr. Snyder, chairman; Lynn M. Shaw and C. C. Pierson. The finance committee is composed of W. O. Moore, chairman; W. S. Frye and Frank G. Laird.

It was decided to work for better legislation in the building of new state and county roads so that the construction would provide for heavy transportation. The members said that on a number of roads used by heavy trucks the specifications for repairing and for new road beds have been too weak. A number of contracts for overhead bridges and elevations have been let with specifications that do not provide for high enough clearances to permit the large stock trucks and transfer trucks to pass beneath.

Field Service and Its Relation to Car and Truck Industry

Properly Conducted Service Station Should Analyze Trouble Quickly—Give Vehicle Owner Definite Estimate of Costs and Expedite All Repair Work.

*(By JOSEPH G. WORKER, Vice President, Phoenix Manufacturing Co., Eau Claire, Wis.)

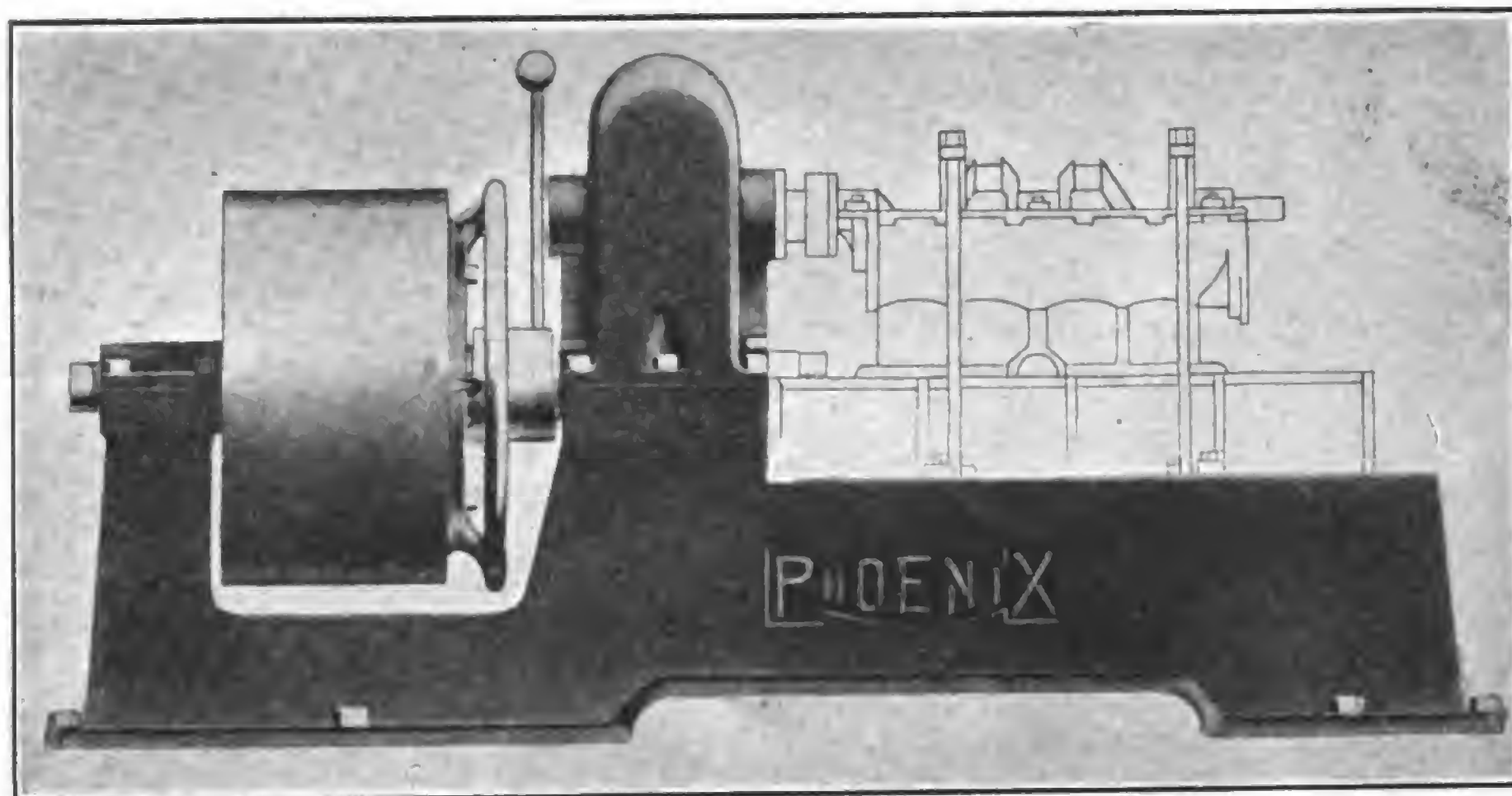


Fig. 1—One of the Best Types of Modern Burning-In Machines.

MILLIONS of dollars go into the automobile and motor truck scrap heap. Much of this is waste, useless extravagance; but the real cause of this scrap heap is not enough "preventive engineering" in the field.

The genius of American engineers in building up the automobile and truck industry is well known. It is one of the marvels of this age and due to this genius the depreciation account, insofar as motor vehicles are concerned, is gradually getting more in line with other industries. Individual parts are being made better so that they wear out more slowly and break less often.

The automotive industry is in substantially the same condition today as other industries when they were young. The agricultural implement industry went through distressing years, mainly on account of the fact that the field and service work was not well organized. Those actually engaged in automotive repair work know that something has been done in building up the field work.

There already is an attempt to make a vehicle last at least a year longer, and this is being done by intelligent repairs to those vital parts that will restore cars to good use and efficiency.

This leads into the trouble with the organization of automotive field service. Considerable literature is available giving the reasons why owners of trucks and automobiles should have cars repaired at certain definite periods. Many reasons have been established why this should

be done and owners of machines are becoming convinced that it is a good thing to do.

In a large majority of garages the practise has been to attempt to repair automobiles, trucks and tractors with very little mechanical equipment. The equipment frequently consists chiefly of the hammer, chisel, hack saw, screw driver, etc., with the result that after a repair job has been done the cost (which no doubt is an honest one) has been so exorbitant that the car owner leaves disgusted with the whole scheme of automobile repair work. All we have to do is

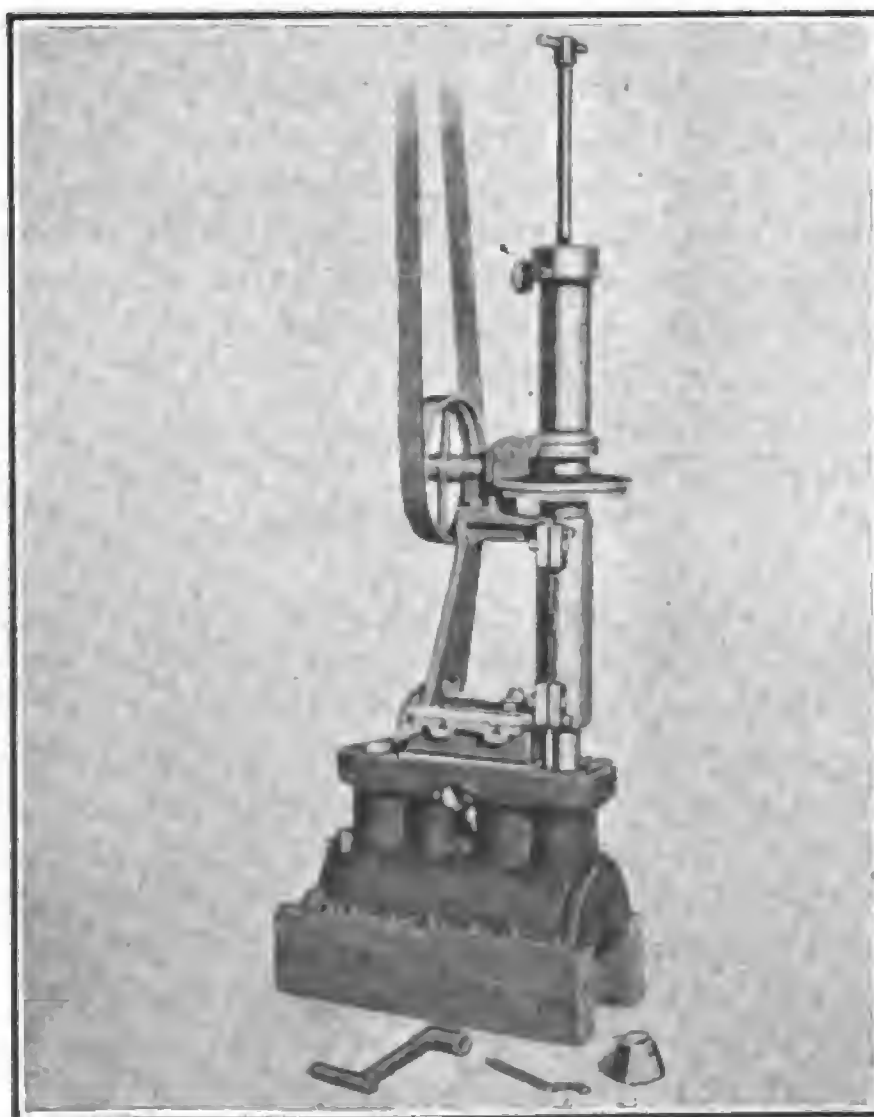


Fig. 2—Phoenix Power Operated Rebor-ing Tool.

to take our own actual experience to convince us that something is wrong in the service end of the automotive industry.

The Trend of Progress.

The trend of progress, however, is going to change this. There is going to be little possibility of a reduction in the price of good cars. Automobiles do not cost too much now, considering the plant investment, the engineering organization that is necessary for its operation and all those things that must be taken into consideration in the cost of making an automobile. There is, however, going to be something done to make a car cost less for upkeep and last longer than six years.

Most everybody has been prone to place the responsibility of this scrap heap on the automobile owner. A careful analysis, however, will show that it does not belong there entirely. The automobile owner is being rapidly educated to the fact that it is necessary to take proper care of his car if he is going to have any pleasure or service out of it. He is eventually going to demand when he puts his car into a service station that they have the necessary mechanical equipment to admit of doing the proper repair operations in a minimum of time.

One prominent automobile manufacturer said that in his opinion it would not be very long before a purchaser of an automobile, truck or tractor would be making inquiries of sales agents, or sales organizations of automobile companies, as to the facilities they had for repairing their cars, or what facilities they were connected with in that immediate community for doing this work. He stated that the replies being made at present to these inquiries to the effect that they would be looked after insofar as any minor troubles were concerned, would not suffice. This purchaser would want to go and convince himself whether or not there was proper equipment available for repairing the car or truck.

In other words, he wanted to know whether his car was going to be repaired by hand, which he knows by experience to be a very expensive way, or whether there was mechanical equipment installed for taking care of the different repair operations.

Some automotive companies have already realized the value of this field service. They have probably taken cognizance of the fact that, sooner or later,

*Member American Society of Mechanical Engineers.

poor field service will reflect back on to the original purchase of machines. For this reason some manufacturers are equipping all of their service stations with efficient machinery, such as is required to give service and repairs to the machines that they manufacture.

It is understood that they will insist that these service stations have necessary equipment for every important repair operation. It is not at all improbable that it will not be very long before these properly equipped service stations can tell definitely how much it is going to cost to do different kinds of repair work and repair operations.

Each Business Analyzed Separately.

It cannot be demanded or even suggested that all garage service stations in the United States be loaded up with a lot of mechanical equipment. Each business will have to be analyzed separately to determine just what is best. There are, however, a few tools that every garage that does any repair work should have. There is no question but that in a little while prices will be set for different repair operations in connection with the repair of cars and it will be found that the service garage cannot repair a car by hand at the figure that will become established.

In order to compete garages will have to be provided with garage equipment and then they can repair a car at a reasonable figure and still make a profit for themselves. This method of car repair will in time be insisted on by all car manufacturers, because there is no doubt that poor car repairing will eventually reflect on the car manufacturer.

If one manufacturer can organize to have his cars repaired from time to time at a low cost, this certainly is going to have its effect on the original purchase of motor cars.

The time is approaching when the repairing of vehicles must be done more scientifically. For example, at one of the repair clinics it was shown that a certain repair job could be done (with garage equipment) to cost approximately \$25, while a garage that did the same kind of work by the old hand method, charged the customer for this same work \$165.

There is at this time need for something that will stabilize this field repair service, and probably the answer is proper organization of field forces and mechanical repair equipment. There are labor saving machines already on the market and devices that a number of automobile and service stations are putting into their plants. Some of the most common used tools at the present time are as follows:

Running-in and Burning-in Machines.

These machines are used to burn-in and run-in bearings of motor blocks. The operation is done in so much shorter time compared with the old method of scraping bearings that there is no comparison between the two. After the bearings have been burned in the motor block is turned over (Fig. 1) and the bearings, connecting rods and pistons are limbered up while running in oil.

One of the most common operations in repair work is reboring cylinders. There

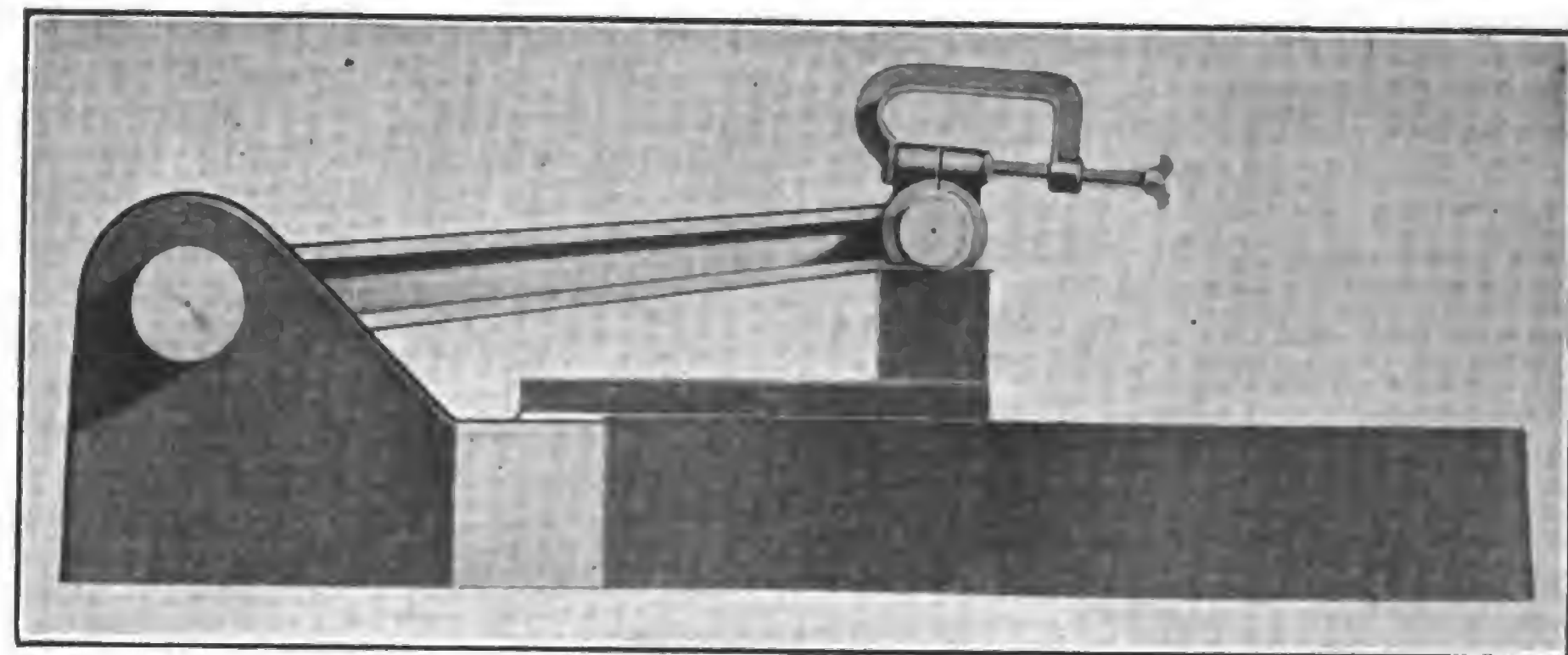


Fig. 3—Phoenix Connecting Rod Aligning Gauge.

are many types of reboring tools on the market (Fig. 2), some of which are operated by hand and others by power. With this tool the garage has every opportunity of doing a cylinder reboring job very quickly and efficiently and above all, accurately. These tools are equipped with cutters to give true and precise work, and so designed that chattering is eliminated.

Rebabbitting and Reboring Outfits.

There are many simple and economical reboring outfits that every service station should have. These outfits are so made that skilled mechanics are not necessary for their operation. Bearings of blocks are easily and quickly rebabbitted and rebored and then the bearings burned in.

Connecting Rod Aligning Gauge.

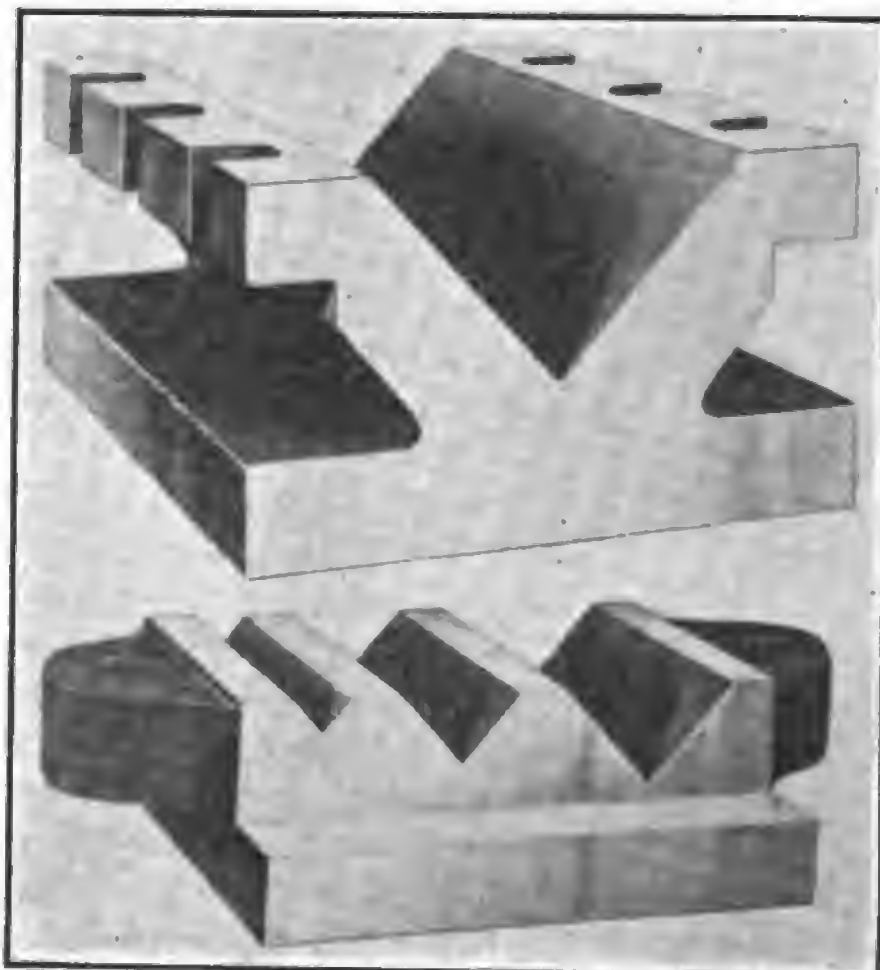
In repairing any motor this tool is very convenient for testing the alignment of connecting rods so they can be straightened before reassembly. This, too (Fig. 3), enables one to quickly locate or correct any twist, bend or any other inaccuracy of the rod and to test the trueness of the bore and the pistons.

Assembly Stand for Motors.

It is very handy to have something to attach the block to when doing any work. Considerable time is lost by inconvenient handling. These stands eliminate the common practise in garages of placing motors on the floor, which necessitates stooping over to perform necessary work.

Drills, Arbor Presses, Grinder Stands, Straightening Presses, Etc.

There are a number of very good ma-



Figs. 4 and 5—V Blocks for Holding Round Bars, Etc.

chines of this character on the market that are adaptable for garage work. They are not too expensive compared with the work they do. These are not only required in garages, but should be found in modern repair shops.

Valve Reseating Tools.

These tools are very valuable, as they do away with unnecessary grinding. They are so designed as to provide means for grinding the valves the same as when the motor left the factory. Some tools on the market are equipped with a motor, so they are portable and easily moved about to suit the convenience of the work.

Combination Front and Rear Axle Stand.

One machine of this type on the market is equipped with vises to make the axle housing accessible for removal of the roller bearing sleeve and to permit the easy removal of the differential and rear axle shaft. This stand has proven very efficient in repair shop work, as by its use the rear axle can be placed in any position. The tool tray and axle support can be folded up when not in use.

Angle Iron and "V" Blocks.

"V" blocks (Figs. 4 and 5) are especially suitable for holding round bars, piston heads or other work that is ordinarily inconvenient to handle and hold rigid because of its shape. The blocks are designed for clamping to a drill press or other machine tools. The angle irons (Fig. 6) are important and a profitable tool for garage equipment. There is now more drill work to be done than ever before, and the angle irons greatly increase the efficiency of the shop, allowing one to conveniently and inexpensively handle work of this class.

These angle irons are about 5 by 6 by 5 inches high and are found generally useful for holding odd shaped pieces on the drill press, in the lathe and on other machine tools. The tool is built to hold the work rigid. If one desires to hold work with bolts instead of with clamps, holes can be drilled in the angle iron.

Electric Test Stands.

These outfits are very necessary when a garage does any amount of electrical equipment work. There are several on the market designed for the purpose of testing all electrical equipment of automobiles, trucks and tractors.

Brake Relining Machines.

This machine is designed for relining automobile brakes. One machine on the market is suitable for all types and sizes and is equipped with five sets of punches

and dies. It will shear the head from the old rivet, remove it from the band and replace it with another type or size.

The machine is operated by a foot lever which allows the operator to use both hands in adjusting and holding the lining in the brake band. This is a convenient tool and is far superior to the old method of hammer and chisel.

The time for lining a 22-hole band with this machine is given as approximately seven minutes. The time consumed with the old style hammer and chisel method is usually from three-quarters of an hour to one hour.

Radiator Test Stands.

This stand consists of a tank used for testing radiators under pressure. The tank is made of galvanized metal with a heavy bottom. One stand on the market is equipped with an air pressure gauge combined with a pressure reducing valve, which automatically reduces any air pressure low enough to do away with the danger of excessive pressure being applied to the radiator. The stand is also used for testing inner tubes, etc.

Piston Vises and Press.

Every garage repair department knows that it is very difficult to hold a piston without some kind of mechanical equipment so that work can be done on it. There are many of these fixtures that hold the pistons during any operation, such as reaming piston pin bushings, lapping and fitting rings, etc.

Wash Tanks.

Motor blocks when taken from the chassis are generally very dirty. A wash tank is especially convenient for washing motors, axles and miscellaneous parts, and by means of a chain hoist or crane the entire motor can be submerged in the tanks. With the tank filled with wash solution one tank on the market takes about one-half hour to heat the liquid to boiling point. A wire basket is furnished for holding small parts while they are submerged in the tank for cleaning purposes.

The brief description of garage repair equipment shows that there has been some engineering thought given to this part of automotive work, but when we make an analysis of the garages that are doing repair work throughout the United States and find so many poorly equipped, it shows the possibilities for future progress.

There is no reason for doing exactly the same things that were done years ago. Just because we formerly were satisfied to repair cars by hand is no reason why this same process should be going on today.

It should be possible that when an owner sends his car into a garage there be a technical analysis made of repairs that are required and the owner given some definite information as to how much it is going to cost for the different repair operations.

Better practise could be established with the service stations in the field if the automobile manufacturers gave more thought to this part of the organization. The purchase of an automobile today, and it will be more so in the future, requires a little more thought than merely

getting rid of the car at the factory. If any product is to be successfully manufactured and survive, that product must be satisfactory in the field. That is, service in the field is a direct charge against the factory.

Need of Cooperation.

Proper repair work in the field can only come by cooperation among all concerned. The automobile owner must expend the money that is necessary to keep his car in good condition. Automobile manufacturers must take a firm stand and insist on service stations being properly equipped so as to give engineering service in the repair of their cars. They must insist that they have mechanical equipment for doing different repair operations.

They should discourage and exterminate the "hammer and chisel" service garage. The service garage should provide the means for the owners to have their automobiles repaired in a business like way. It is not necessary to be loaded up with equipment, but for standard repair operations, necessary service equipment should be on hand.

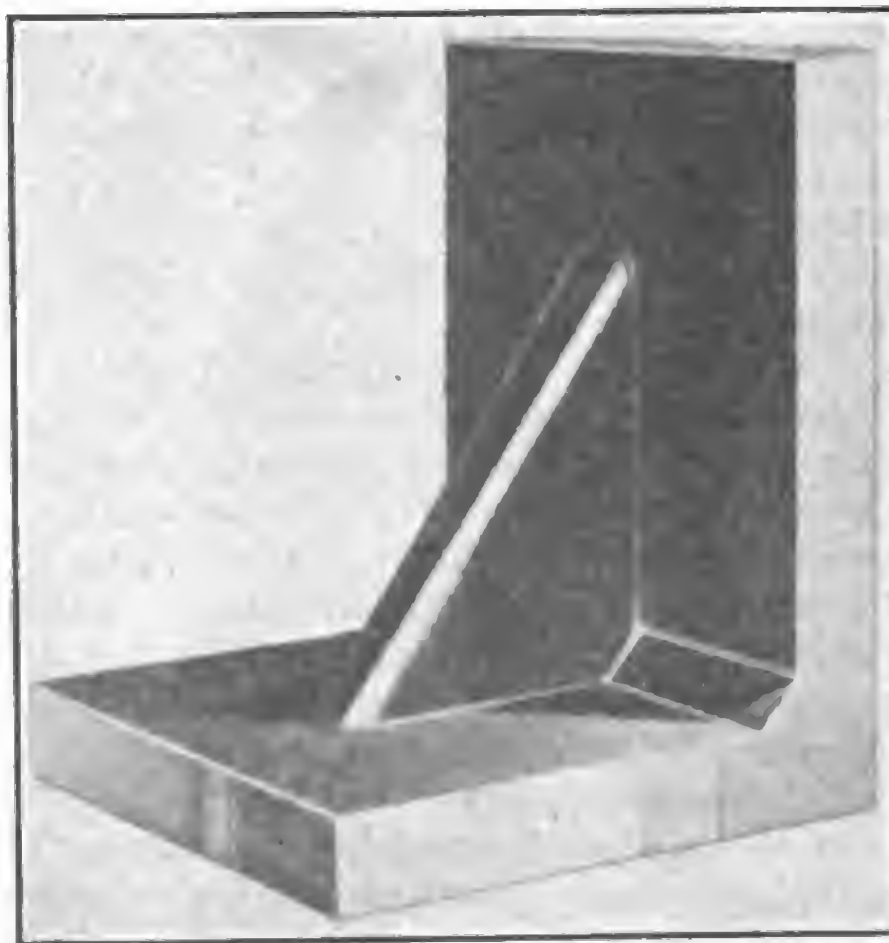


Fig. 6—Angle Irons Are Found Useful for Handling Odd Shaped Work.

Repairs are being made today on automobiles, trucks and tractors that do not follow the principles that are commonly known to be right for repair work. One frequently hears of enormous charges being made for minor repairs and small operations, or that considerable time was spent on a job without doing anything. This indefiniteness seems to be the most prolific source of discontent in so far as automotive repair work is concerned. There are many things that affect the proper operation of a machine and unfortunately a purchaser or user cannot appreciate what it means to analyze automotive troubles, and the time that is necessary to determine just what must be done.

A proper service station, however, should be capable of analyzing these troubles quickly and present the results of this investigation to the car owner. It should further be possible to give the car owner definite prices for taking care of the different repair operations found necessary. With this kind of cooperation the service garages will have no chance of failure, and the car owner will be sat-

isfied that the field service of the automotive industry is at last handled in a business-like way.

RUBBER INDUSTRY.

AKRON, O., Sept. 11.—Practically all Akron tire factories are maintaining schedules started this month, but with little material change in production or employment figures. Goodyear is lowering production, with the laying off of 900 men this month. Firestone continues at peak production of over 23,500 casings and 30,000 tubes a day. Rubber heel and sole and mechanical goods departments of local factories report continued heavy orders. All these departments are operating on a basis of over 60 per cent. normal.

SOUTH CAROLINA IS BUSY ON HIGHWAYS.

CHARLESTON, S. C., Sept. 15.—Of slightly more than 450 miles of roadway which have been under construction in South Carolina during the first half of the year by the state highway commission, approximately 240 miles is described as already having been completed. Work on 450 miles to date is in progress in 36 of the 40 counties of the state, it being reported that practically all the counties are building good roads on their own account. The county construction for the six months' period has been placed at 179 miles.

PHILADELPHIA MANAGER FOR WHITE.

Fred H. Williams, Cleveland, O., has been appointed manager of the Philadelphia branch of the White company, succeeding J. D. Howley, who retires on account of ill health. In going to Philadelphia Mr. Williams relinquished the office of vice president of the company. As an executive at the company's home office in Cleveland he was in charge of the general sales department, a position he had held for seven years. Mr. Williams has made a special study of truck operating requirements in big corporations and in complex industries, his contact with installations of all sizes giving him a knowledge of truck transportation which few men have had the opportunity to acquire. As Philadelphia manager he will direct the White business in a large territory, comprising the eastern half of Pennsylvania, the southern half of New Jersey, the State of Delaware, the District of Columbia and the northern part of Virginia. Operating as a part of this organization are branches in Wilmington and Washington and a large dealer representation.

It is reported that more than 1700 tourists have been carried daily through the Yellowstone National Park by the 150 Goodyear-equipped motor busses that are employed in this service. And, while the roads in the park are not paved, they are reported to be good enough to allow visitors to see the marvels of America's "Wonderland" in comfort from these rubber-tired vehicles.

HERE and THERE

Stowe Made Manager of Reo Motor Co.

Veteran Automobile Man Takes Charge of Reo Interests in New York City—Plans Sales Campaign.

LANSING, MICH., Sept. 12.—R. C. Rueschaw, sales manager of the Reo Motor Co., has appointed George Stowe general manager and vice president of the Reo Motor Car Co. of New York to succeed J. J. Hunt, who has resigned.

Mr. Stowe has severed his connection as president and general manager of the New York Mitchell Motor Co., Inc., which position he has held for the past five years. He is a pioneer in the motor car business, having been identified with it since 1904, and his experience will assure Reo owners splendid service and courteous treatment. In 1909 Mr. Stowe was vice president and general manager of the Chalmers Motor Co. of New York. He has had a successful career and his new appointment augurs well for the increased sales of Reos.

Mr. Stowe does not contemplate making changes in the personnel of the Reo Co. or "family" as he calls it, and he is now planning a sales campaign of wide scope.

NEW PRICES FOR KOEHLER TRUCK.

The H. J. Koehler Motors Corporation announces the following new prices on the Koehler line of worm-drive trucks:

Model D 1½-ton, \$1885; Model M 2½-ton, \$2875; Model MCS 2½-ton, \$2975; Model F 3½-ton, \$3985; Model MT five-ton road tractor, \$2975.

These new prices represent a substantial cut from the former list.

ROADS EXPECT A BOOM.

CHICAGO, Sept. 13.—Equipment and supply reports for the last week showed numerous inquiries, indicating that the carriers are preparing to put their properties in complete working order to handle the expected traffic revival. The Chicago, Rock Island & Pacific Railroad Co. is inquiring for 10 Mikado type locomotives and for 200 gondola cars, and is also asking for bids for the repair of 500 all-steel general service cars; the Illinois Central is asking for figures on the repair of 1250 gondola cars and the Peking-Kaigan of China is inquiring through the car builders for 200 gondola cars of 40 tons capacity each.

Other items in the equipment line the

last week include the Canadian National Railways, which will receive bids at Toronto until Sept. 17 for 1,000,000 railway ties, and Mitsui & Co., which is asking for bids for 4000 tons of 60-pound rail and 200 tons of splice bars for the Japanese government railways. The Chicago, Rock

DES MOINES DROPS STREET CAR LINES.

Motor Busses Supplant Trolleys in City.

DES MOINES, IA., Sept. 12.—Motor busses are now the sole means of transportation about the city of Des Moines, Ia., the street car system, which has long lost money, having ceased operation on the order of bond holders to start foreclosure proceedings. The busses are covering the routes of the street cars so thoroughly that it is believed the latter will never be missed. The city has taken over the direction of motor bus transportation, licensing the vehicles and assigning them to routes.

Island & Pacific will construct a new car repair shop at Trenton, Mo., with the company forces, while the Great Northern contemplates the construction of new ore-loading docks at Superior, Wis.

Kubach Heads Moreland Motor Co.

Los Angeles Concern Further Strengthened by Election of Other Officials—Look for Good Business.

LOS ANGELES, Sept. 15.—C. J. Kubach, president of the Kubach Construction Co. and one of the most prominent business and financial men of Los Angeles, was elected president of the Moreland Motor Truck Co. at the last meeting of the directors. He succeeded R. H. Raphael, who has been in the office since the organization of the company 11 years ago. Raphael asked to be relieved that he may give more attention to his other varied interests. He will remain and give the company the benefit of his experience upon the board.

Watt L. Moreland, who from the inception of the company has been its active guiding hand in the position of general manager, was elected a vice president in addition to his other position.

Morris Cohn, long identified with the board, was chosen first vice president. J. L. Armer continues as secretary-treasurer. I. O. Levy, also a veteran member of the board, continues, and the board was further strengthened by the addition of Lemuel Goldwater, prominent Los Angeles merchant and financier.



The Motor Truck is the "Ground Ace" of Modern Industrial Life—It May Not Perform in Quite as Spectacular Fashion as Aeroplane but Its Efficiency is Unquestioned.

Modified Truck Bill Passes Assembly

Interests Pleased at Elimination of
Objectionable Features by
State Legislature.

DALLAS, TEX., Sept. 14.—Motor truck dealers and operators express themselves as being much pleased by the passage of a bill by the Legislature repealing the objectionable features of the motor truck law. This law was enacted at the last regular session of the Legislature. As the measure finally passed both branches it increases the annual license fee on commercial vehicles according to net carrying capacity and tire equipment, but the mileage tax imposed by the regular session of this Legislature is eliminated. Trucks and tractors used exclusively for agricultural purposes are exempted from the special license fees stipulated in the bill, but it is provided that license fees shall be paid on agricultural trucks according to horsepower just as now paid by automobiles. Fees for tractors not used for agricultural purposes are based on weight.

Under an amendment adopted by the conference committee a license shall not be issued to any truck of more than four tons' carrying capacity, except on written application to the Highway commission showing that roads would not be injured by such trucks. The bill provides, however, that no license shall be issued to trucks of more than five-ton carrying capacity.

Another section of the bill provides that county road superintendents or supervisors may during wet weather prohibit the use of any highway to loads of such weight as would damage the roads.

Speed limits are fixed according to the gross weight of the vehicle and load and according to tire equipment. Pneumatic tire equipment is favored in this as well as in the case of license fees, higher speed limits being allowed vehicles equipped with pneumatic tires as lower

license fees have been provided for such vehicles.

All trucks must be equipped with rear-view mirrors and no truck shall operate with solid tires less than one inch in thickness at any point or with pneumatic tires where one of such tires is missing. Drivers operating cars in this condition are subject to a penalty of not more than \$200 as are also those drivers who operate vehicles of more than four-ton carrying capacity without special permit.

NEW AMERICAN TRADE BUREAU BE- ING ORGANIZED.

NEW YORK, Sept. 12.—Colonel S. Graae, widely known in South America and Europe as a civil engineer, sailed

TOM EDISON STUFF!

G. A. Urquhart, Pacific coast manager of the White Co., submits the following somewhat belated questions for Mr. Edison to answer:

1. Has a motor truck a fifth wheel?
2. Of which are there the most, manufacturers of motor trucks or passenger cars?
3. Hanging from the frame of an oil tank truck is a small chain that is lowered to the road every time the faucets to the tank are opened. Why is this done?
4. What is a dump truck called in London?
5. What truck uses the albatross as an emblem?
6. How can you arrive at the road speed of a motor truck?
7. What proportion of the gross load is carried on the rear wheels?
8. What is the largest single order of motor trucks ever taken?

from New York for Buenos Aires on Aug. 25 to perfect the organization of the new American Trade Bureau which he has established. This bureau's field includes Argentina, Uruguay, Paraguay and Bolivia and its main headquarters will be in Buenos Aires.



Main Works of Southern Motor Manufacturing Association, Near Houston, Tex.,
Where Ranger Trucks Are Made.

Motor and Accessory Body Has Slogan

Plans Intensive Drive for Confidence
in Automotive Industry—Credit
Convention at Detroit.

NEW YORK, Sept. 6.—A message of courage in the automotive industry will be sent broadcast, beginning today, by the Motor and Accessory Manufacturers' association through its 400 affiliated companies, the principal manufacturers of parts and equipment in the field.

The message, which will be used on stationery, advertising and catalogues, follows:

HAVE FAITH IN YOUR INDUSTRY!

The facts justify it—
Courage compels it—
Progress assures it—
Destiny proclaims it—
Business requires it—
The world needs it—

Civilization will not go into reverse—
**THE AUTOMOBILE INDUSTRY MUST
GO FORWARD!**

This slogan expresses the spirit and plan of the credit convention which the association will hold at the Hotel Statler, Detroit, Mich., Sept. 14, 15 and 16, 1921.

In addition to the topics relating to finance and credit, there will be a symposium by the sales and advertising executives on the subject, "Selling Strategy to Bring the Automotive Industry Back to Normal."

In line with the association's message of unswerving confidence, several speakers will discuss the topic, "Why I Have Faith in the Automotive Industry."

DETROIT TRAILER NOW HAS HEAVY-DUTY MODEL.

DETROIT, Sept. 10.—The Detroit Trailer Co. announces a heavy-duty semi-trailer capable of carrying a load of 50 tons, which it is now preparing production on. The semi-trailer, which was given a thorough trial last week, was found fully practicable for the work designed. Several orders for first production were placed following the trial.

The semi-trailer departs from the conventional in that it has four wheels in line instead of two. This gives it a total tire surface of 48 inches and permits a load disposition of about 800 pounds a square inch. Double spring action is provided.

Specifications of the semi-trailer, in addition to Mansfield axles and steel frames, call for Timken bearings and Detroit springs. The list price has been fixed at \$2750.

The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., and the Russell Grader Manufacturing Co., Minneapolis, Minn., have affiliated in the production and marketing of the Russell Motor Hi-Way Patrol, which is a new product recently designed for the maintenance of dirt roads.

Implement Industry Asks for Tax

National Implement & Vehicle Association May File Protest to Protect Home Products.

CHICAGO, Sept. 13.—Although the proposed tariff bill (H. R. 7456) recently introduced in Congress has placed imports of Canadian farm implements on the free list, hope is still entertained that the industry will yet be served in a way which will place the manufacturers of farm operating equipment in the United States on an equal footing with their Canadian competitors. Canada, as is well known, has an almost prohibitive tariff on farm machinery, which prevents any considerable exportation of implements by this country to the Dominion.

Some manufacturers believe that the provisions of sections 301 and 302, title three, of the new tariff bill will provide a means for securing the relief sought, contending that reciprocal duties may be levied in a commercial treaty to be negotiated by the President. Others maintain that a strict construction of these sections will not permit this step, declaring that the issue in question is whether Congress, in the proposed bill, has delegated to the President full power to negotiate reciprocity treaties with foreign countries, including the removal of items from the free list and placing them on the dutiable list.

Because of the uncertainty which prevails, manufacturers connected with the National Implement & Vehicle association have authorized their national legislation committee to give full consideration to the tariff question, with power to file a protest with the proper governmental authorities if, in the opinion of the committee, the interests of the farm machinery manufacturers of the United States are not fully protected under the proposed tariff act.

Tractors Not Mentioned in Bill.

The section of the proposed bill which relates to agricultural implements does not specifically mention tractors and inquiry will probably be made to ascertain whether it is the intention to include them in the list of farm machinery to be admitted free. Among the articles of equipment which are not subject to duty under paragraph 1504 are plows, tooth and disc harrows, headers, harvesters, reapers, drills and planters, mowers, horse rakes, cultivators, threshing machines, cotton gins, machinery used in the manufacture of sugar, wagons and carts and "all agricultural implements of any kind and description."

REO SHIPS TRAIN LOAD OF SPEED WAGONS.

LANSING, MICH., Sept. 12.—Another indication of a return to normalcy and a further proof that business conditions are getting back to their old-time footing is evidenced by the shipment of Reo

Speed Wagons which has just been sent out by the Reo Motor Car Co. at Lansing. This is the second solid train load of Reos to leave the Lansing factory within a period of three weeks. As in the previous case, the train load is bound for the East, consigned to the Linscott Motor Car Co. of Boston. Reo officials believe that this is the first train load of trucks ever shipped for commercial use. At least it is believed that it is the first

ANOTHER BLACK EYE.

DETROIT, MICH., Sept. 12.—One of the largest office buildings in the world was recently erected in Detroit. An immense yardage of earth had to be removed quickly. Contractors insisted on every truck hauling an overload. Three and one-half ton trucks carried five or six tons, while five and six-ton trucks were forced to load up with eight and 10 tons.

The result of this overloading was the absolute destruction of about 20 blocks of heretofore adequate pavement, which was pounded into the worst possible condition within a few short weeks' time. As a result of this greediness on the part of the contractors the public had to be put to the expense of building several blocks of new roadway. Result: Another ordinance restricting the use of the truck and hurting the entire truck industry was passed. All the result of the greediness of a contractor.

train load of the same capacity and model ever sent out.

The first train load, about equally divided between passenger cars and Speed Wagons, was shipped to Boston two weeks ago. It comprised 237 units and this shipment was scarcely on its way when another telegram was sent from Boston asking for an additional train.

Greatest of Garages for Chicago

New Structure to House 1000 Cars Will Be 10 Stories High—Probable Cost About \$2,500,000.

CHICAGO, Sept. 12.—This city is to have the world's greatest garage for its loop motorists. With the ground it will cost \$2,500,000; it will be 10 stories high and will accommodate 1000 cars.

It will be on South Water street, between State and Wabash, and will front north 200 feet on the new two level boulevard, overlooking the plaza which will supplant Hibbard, Spencer, Bartlett & Co.'s building.

Architect Leon E. Stanhope has drawn plans for a structure which will have foundations for 10 additional stories later on.

President H. D. Jackson of the Interstate Garage Corporation, owner of the site, said it would be the finest and largest garage in the world.

"There'll be shops fronting on the upper level of the new boulevard," he said. "The Illinois Automobile club has arranged to use most of the second floor. Above that all space will be given over to cars. We'll use the divided floor plan by which a car can be easily driven to the 20th floor, if we decide later on to make it that high.

"Ramps, or inclined planes, will be used, with passenger elevators, for automobilists coming down after driving up their cars, or going up for their machines.

"The building will be at least 200 by 150, with 10 stories to start with. We can't give the exact location for the reason that we're negotiating for additional space. As it is, there's nothing in the world as large as this will be.

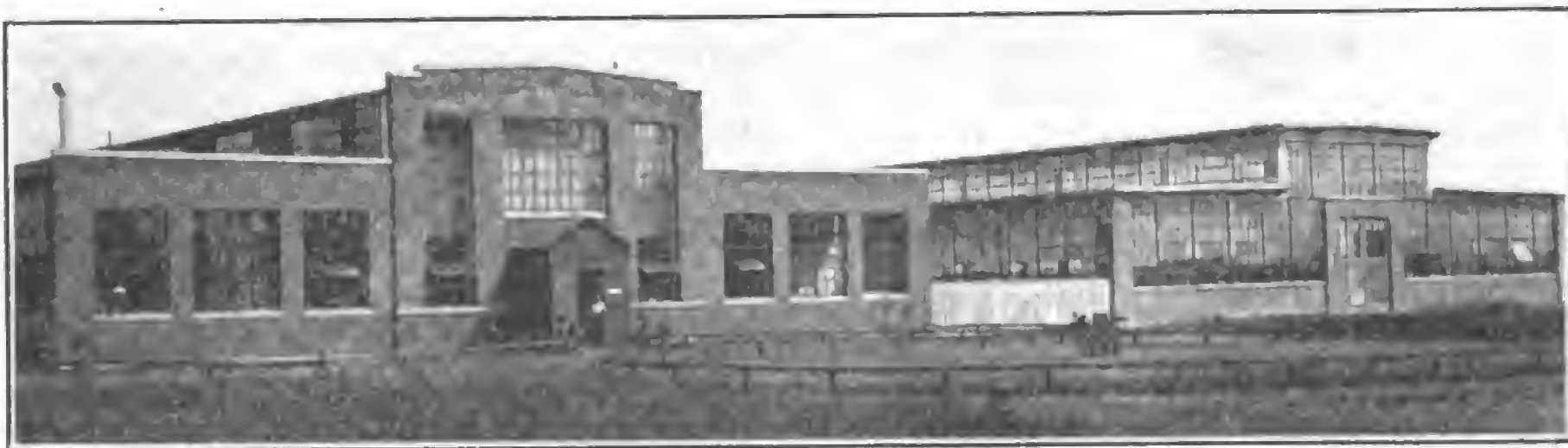


This Nash Truck Made Trip from Clinton to Yellowstone Park and Return as a First-Aid Service Truck in Boy Scout Tour—Fifty-Five Automobiles Took Part in the Trip Which Covered More Than 3800 Miles—The Nash Truck Carried a Complete Service Equipment and Was Manued by Three Mechanics.

Freight Rates Delay Building

High Rail Charges Responsible for Cost of Materials, Says Prominent Authority.

CAMBRIDGE, MASS., Sept. 12.—Further reduction in the price of many of the basic building materials are not to be expected until a reduction in freight rates, according to Kendall P. Foster, treasurer of the S. C. Perry Co., engineer and contractor of Cambridge.



Modern Plant of the Smith-Springfield (Mass.) Body Corporation.

"When freight rates come down," declared Mr. Foster, "building will be cheaper. Meanwhile, steel and several other basic materials are practically down to pre-war production costs plus the cumulative effect of extra freight costs. Labor rates are not unreasonably high with respect to the cost of living. Skilled labor at 90 cents is 50 to 60 per cent. higher than in 1914. Common labor, at 30 to 45 cents, is not high compared with the peak. This is a descent of 100 points in 14 months.

"These figures apply to concrete construction, which did not rise as high and has not dropped as fast as other forms of building. The rest of the descent will be slow and painful."

The S. C. Perry Co. estimates that a reinforced concrete building, 72 feet by 164 feet, six stories high, would cost \$147,900, or \$2.50 a square foot. Last month the estimate for a building of the same size and specifications was \$159,220. The estimate one year ago, when building costs were about at their peak, was \$179,200.

These figures indicate the scope of the downward trend of building costs since one year ago.

S. A. E. TO VISIT ABERDEEN PROVING GROUND.

NEW YORK, Sept. 15.—The Washington, Pennsylvania and Metropolitan sections of the Society of Automotive Engineers, together with members of the parent organization, will visit the Aberdeen Proving Ground on Oct. 7 at the invitation of Major General C. C. Williams, U. S. A., chief of ordnance. Members of the American Society of Mechanical Engineers and the Army Ordnance association will also participate in the visit and the latter organization will hold its annual convention at the Proving Ground on that date.

The Proving Ground is, in the opinion of engineering experts, the most complete establishment of its kind in the world and during the war a plant for the manufacture of guns and the loading of gas shells was constructed and put into operation there.

The invitation of General Williams provides an unusual opportunity to note the progress that has been made recently in the development of guns, projectiles, armor plate, bombs, air craft and mobile mounts.

The meeting will begin early in the morning and will last through the entire day. Among the features of the programme will be

- (1) Firing of small arms, includ-

ing tracer bullets from machine guns.

- (2) Firing of mobile guns.

- (3) Firing of major caliber guns from 12-inch to 16-inch.

- (4) Demonstration of tanks, tractors and trailers.

- (5) Demonstration of bomb-dropping from balloons and air planes.

After dinner a smoker will be held at which a number of short talks will be given.

According to War Department regulations, admission will be limited to citizens of the United States, with the exception of those manufacturing munitions for a foreign government which is at war at the time of the meeting.

FORD COPPER PLANT.

DETROIT, MICH., Sept. 12.—White Pine Extension, located in Ontonagon county, near White Pine, has disposed of its surface plant, consisting of boilers, hoists and miscellaneous equipment, to the Michigan Iron Land & Lumber Co., representing the Ford interests of Detroit, which are to operate the Imperial iron mine near Michigamme, Mich. The Ford mine, it is understood, will be operated by electric power transmitted from the Menominee river.

Doubtless the dismantling of the White Pine Extension plant means the end of the career of that property which, for several years, has been held by the Resource Development Co. of Detroit.

Is Shown in Moving Pictures

United States Motor Truck Stars in Silver-Sheet Production of "Rapid Transit."

CINCINNATI, Sept. 13.—T. J. Alvin, general manager United States Motor Truck Co., in a letter to Motor Truck, says: "We at the Cincinnati plant of the United States Motor Truck Co. think very highly of the United States truck. We believe in it. That's because we know it so well. We have the feeling that everybody else would hold the truck in the same high regard if they could only approximate our intimate acquaintanceship with the truck—if they could only visit the plant and actually see the truck made.

"Therefore, a plan was adopted whereby thousands of Americans in the months to come will make a trip to Cincinnati for a tour through the plant. The pilgrims to Ohio will travel as the guests of the company, but at not such a very great expense to the company. There will be no railroad fares, no hotel bills, for the trip to Cincinnati will be made via the 'Film Rapid Transit.'

"Our two-reel picture was produced by the Rothacker Film Co. of Chicago. In 35 minutes it whisks the audience to Cincinnati, and makes the 'tourists' so well acquainted with the United States truck that when the adventure aboard the celluloid magic carpet comes to an end they know that the United States truck is a good truck.

"The writer took the film to St. Louis for its premier showing, which was in cooperation with the United States Truck Sales Co., which has the agency in that city. Personal invitations were extended to big St. Louis business men. Among those present at the show were business heads who do not at present use our trucks. Letters received following the showing indicated in what direction the next order for trucks would go. Also in the audience was a banker who owns the company having the United States truck agency in a nearby small city. A letter received from him told that the picture sent him back home accompanied with a better acquaintanceship, a fuller appreciation of the truck which undoubtedly will be reflected in the future sales record of that agency.

The motion picture's first job will be to make the agency owners the country over better acquainted with the truck. Then the picture will join the agency owners' sales staffs. The silent salesman will work without pay. Copies of the picture will be supplied to owners desiring to stage their own showings. However, if necessary, our zone men will put on the showings for the owners."

AKRON, O., Sept. 10.—An Akron man, G. B. Daniels, 514 Wabash avenue, reports that he has succeeded in growing cotton in the garden at his home. This cotton is in full bloom.

Present Status of the Townsend Bill

Laying Foundation for Sound Federal Road-Building Programme at Washington.

NEW YORK, Sept. 15.—M. L. Hemingway, general manager of the Motor and Accessory Manufacturers' association, in a recent letter to Motor Truck says:

"The Federal Highway bill, which is a compromise of the Phipps-Dowell and Townsend bills, with modifications made in conference, has passed the Senate and now goes to general conference.

"It is, of course, disappointing that the commission form of administration was eliminated from the bill, but in the event that the bill in its final form becomes a law, all those who have worked in support of Senator Townsend may feel that they have made important progress in having brought about an organic act which will definitely confine the expenditure of federal funds and which inevitably will be amended later to a definite construction and maintenance of an interstate system, solely at the expense of the government.

Why Commission Feature Was Eliminated.

"Probably the governing reason for the action against the commission in the minds of most of the senators was the fiasco of the shipping board; the blunt rejection of Senator Norris' proposal for an export commission and the savage attacks which have been made on similar proposals during the present situation. These successive verbal engagements had a cumulative effect, which doubtless was responsible for the absence of many of the friends of the highway commission from the senate chamber when the vote was taken. In view of their attitude for economy and against the commission, the absentees probably felt it extremely impolitic to join in the highway proposal at this time. Another factor was the statement that the reorganization commission is now working out plans for a consolidation of all public works departments.

"Senator Townsend has devoted more than two years to this bill and is entitled to an expression of appreciation for his unselfish adherence to the cause in which he believed whole-heartedly and which in a political sense it may not have been to his advantage to press.

"The following are the principal features of the Interstate Highway system recognized in the bill:

"1. The bill confirms all federal expenditures to seven per cent. of the total mileage in each state, and requires that 60 per cent. of the funds shall be expended upon three-sevenths of the seven per cent. of mileage, which shall consist of the primary roads of interstate importance. A further proviso gives state highway commissioners the right to exceed the 60 per cent. where they deem it desirable. Under no conditions can more than 40 per cent. be expended on the

A. E. A. WANTS SLOGAN.

CHICAGO, Sept. 13.—The Automotive Equipment association has made an appeal to the industry for a slogan fitting the intensive sales campaign now being waged by the association. Anyone having ideas for such a phrase may correspond directly with Ray W. Sherman, merchandising director of the association, City Hall Square building, Chicago, Ill.

state highways which comprise the remaining four per cent. of the total seven.

"2. Under the provisions of the bill \$75,000,000 is appropriated for road expenditure for this year, \$25,000,000 of which becomes immediately available, the remainder available at the end of six months. A sum of \$5,000,000 is appropriated for the construction of roads and trails within forest reservations.

"3. Drastic maintenance provisions, a flexible formula of matched funds for those states having five per cent. or more



Executive Office of Duesenberg Automobile and Motors Co., Inc., Indianapolis, Ind., Home of the Famous Racing Car.

of their area held in public lands, more rigid requirements governing types and surfaces of highways, a clause that states must match Federal funds with funds from state sources or so controlled (with a two-year exception to enable changes in laws), a paragraph directing the secretary of war to transfer surplus material available for highway use to the Department of Agriculture, are some of the other provisions which make the measure as a whole a distinct advance over existing statutes.

"4. The form of administration seems to remain unsettled as yet and not likely of decision before the report of the reorganization commission has been completed.

"5. The bill now goes to conference as the House has agreed upon and passed most of the provisions save that relating to appropriations. Should the conferees accept this provision from the Senate the way will be clear for a nation-wide drive in highway construction, particularly so in those states which have had to hold up contracts and plans pending a final decision of policy by Congress."

Does Not Remedy Highway Problem

Legislation Against Motor Trucks Is Futile—Must Build Permanent Roads Also.

PONTIAC, MICH., Sept. 13.—"Limiting the tonnage capacities of motor trucks by legislation is not attempting to remedy the wear and tear on roads. The railroads of 90 years ago may as well have ruled against locomotives larger than the De Witt Clinton, with its puny strength and its inadequate speed." This is the comment of President W. L. Day of the General Motors Truck Co., Pontiac, Mich., on the widespread enactment of laws against the operation of heavy-duty trucks on the public roads. When locomotives were built heavier the rickety strap iron rail gave way, and then came the 40, the 60 and the 100-pound rail. "In its place the heavy-duty truck is as logical as the mogul engine. Trucks are now carrying half as much freight as the railroads and trucks will increase their tonnage carrying. So the solution of the

roads problem must eventually be a serious effort to build roads to support heavy traffic—and permanent roads, too.

"Since transportation as a factor in distribution is one of the serious problems of these times, and since the railroads have failed to meet the exigency, motor trucks must. There is, however, a growing demand for a sturdy one-ton truck as a general purpose vehicle and, since we reduced the price \$500 on our K-16, the orders have been rolling in in a very gratifying way, indicating that there is a real revival of business setting in."

RECEIVER APPOINTED FOR SIGNAL TRUCK.

PORTLAND, ME., Sept. 10.—Judge Hale has appointed P. G. Clifford of this city receiver for the Signal Motor Truck Co., a Maine corporation, with its plant at Detroit. Judge Hale also issued a decree for the dissolution of the corporation. The action was taken on complaint of M. B. Hoagland, general manager of the company.

Excise Tax Receipts on Trucks Lower

Internal Revenue Collections Decrease—Treasury Department Gives Figures on Cars and Trucks.

NEW YORK, Sept. 15.—Total collections of internal revenue from all sources for the fiscal year 1921 show a decrease of \$812,500,000 over the fiscal year of 1920, according to a confidential release received from the Treasury Department.

The chief decrease is found in income and profit taxes, which are \$731,000,000 less than they were in 1920, while miscellaneous taxes have dropped \$81,000,000.

The excise tax on automobiles, etc., for 1920, was \$143,922,792.01; for 1921, \$115,545,760.38; a decrease of \$28,377,031.63.

Carried out in detail these figures are as follows:

1920—Auto trucks, wagons..\$14,471,464.32
1921—Auto trucks, wagons.. 11,640,051.98

Decrease \$2,831,412.34
1920—Other automobiles and motorcycles\$76,315,814.26
1921—Other automobiles and motorcycles 64,388,105.80

Decrease\$11,927,708.46
1920—Tires, parts or accessories for autos.....\$53,135,513.43
1921—Tires, parts or accessories for autos..... 39,517,602.60

Decrease\$13,617,910.83

LOWER TRUCK PRICE.

DEFIANCE, O., Sept. 3.—Price reductions of from \$280 to \$475 on all models of Defiance trucks were announced Friday by the Defiance Motor Truck Co. Prices on one, 1½ and two-ton models are now \$1695, \$2095 and \$2275 respectively, a substantial reduction.

GOOD ROADS CONTROL PLANNED BY STATE.

MUNCIE, IND., Sept. 13.—A real boom to the good roads movement in and about Muncie, Ind., is seen in the law passed by the last Legislature requiring a patrol maintenance system designed to protect gravel and macadam roads from being travel worn. The new law provides that annually the county highway superintendent shall file with the county commissioners a report disclosing the ways and means which should be employed during the year to improve and take care of the roads under his supervision. It has been estimated that this law will save the county thousands of dollars yearly in the repairing or rebuilding of roads.

STEEL SPRING ACTION REFUTES BEAR TALK.

NEW YORK, Sept. 13.—Railway Steel Spring directors have voted the regular quarterly dividend of 2% on the preferred and at the same time put out a statement of earnings and business prospects which took Wall street by surprise.

Not only was this dividend on both classes of stocks more than earned during the first half year, but liquidation of inventories and receivables has increased cash and investments so that these stand at \$9,200,000. Meanwhile, accounts payable have shrunk to \$100,000 and the president announces that the company is "experiencing some improvement in business conditions."

Detroit Sees First Trolley Bus

Seats 29 Persons—Control of Power and Brakes Worked by Feet of Operator—Made by Packard Co.

DETROIT, Sept. 12.—The Packard Motor Car Co. recently demonstrated its first trackless trolley bus, a vehicle built in conjunction with the Westinghouse Electric & Manufacturing Co., as a working model for operation on the new city owned trolley lines in this city.

The bus was built to meet specifications designed by city officials and if present plans are carried out it is authentically stated that 50 will be ordered for immediate operation in the city streets. President Alvan Macauley of the Packard Co. said that this number could be delivered in a very few weeks if the order is given. The estimated cost is slightly more than \$8000 each.

Other bids were received, but the Packard Co. was the only bidder to furnish a working model. Other bidders were: J. G. Brill Co., Philadelphia, \$8744; Standard Motor Co., Detroit, \$8950; National Safety Car & Equipment Co., St. Louis, \$7325; St. Louis Car Co., \$7800; International Motor Truck Corporation, Detroit, \$9988.

Mayor Couzens, much impressed with the possibilities of the vehicle for public transportation, said:

"I do not wish to appear definitely committed to this type of car, but from what I have seen I believe it can be used very successfully in conjunction with our municipal lines and, with time, developed to give adequate service in the downtown district."

The street railway commission of the city was represented by Commissioners William B. Mayo and G. O. Ellis, the former chief engineer of the Ford Motor Co. Though each considered the bus practical for suburban districts, they said it would have to be considerably developed to meet requirements of transit on busy streets. Further action will be taken at a later meeting.

The vehicle used followed the usual bus outlines except for the double trolley pole on the roof. It was 24 feet long, eight feet wide and weighed 11,500 pounds. It seats 29 persons, but the design which the Packard Co. plans will seat about 40.

Through the special trolley arrangement the bus was enabled to range from one curb line to the opposite one. Its turning area was small, considering its size.

Control of the bus, both power and brakes, is worked by the feet of the operator. There is also an emergency hand brake. Power is thrown on and off by a treadle. There are two speeds, 15 and 25 miles an hour, all regulated by foot pressure. Both hands of the operator are free to steer and to handle fares and the single door.



A Truck Sales and Service Station in Holland—This is the "Establishment of Naam Venn Hamin," at Reinkenstraat, the Hague.

U. S. Rubber Shows \$4,875,223 Deficit for Six Months

Reserves Created Out of Income Sufficient to Cover Decrease—Latter Half of Year Will Show Improvement Say Officials.

NEW YORK, Sept. 10.—The United States Rubber Co., for six months ending June 30, reports a deficit of \$4,875,223 after all interest and other charges in contrast to a net income of \$13,690,924 after allowing for interest charges, depreciation and federal taxes, reported for the corresponding 1920 period. That net income was equivalent to \$13.65 a share on the \$81,000,000 of its common stock outstanding after an allowance for dividends on its preferred issue.

C. B. Seger, president of the company, in making the announcement said that in ascertaining the results of operation for the first six months of 1921 the cost of goods sold was computed on the basis of goods sold carried in inventory as of the first year plus the cost of goods manufactured during the period, this absorbing in cost any depreciation that may have occurred in inventory after Dec. 31 and also the higher cost of goods in the half-year period.

The cost of finished goods carried over as of the first of the year, he said, was conservative on the basis of the selling prices then prevailing, which it was believed would be maintained through the interval necessary for the liquidation of the company's stocks. Subsequently, however, lower selling prices were found to be necessary for certain classes of its merchandise, particularly tires and mechanical goods.

He said that the business recession continued in the first six months of 1921, with improvement, however, in the latter part of the period. The company's manufacturing operations were curtailed, he stated, to the minimum consistent with actual requirements, and with the result that producing costs increased, due mainly to overhead expenses which could not be eliminated.

He drew attention to the inclusion of selling expenses, the benefits of which, owing to the seasonal nature of the company's business, would be reflected favorably in earnings for the last half of 1921, in charges for the first half of 1921.

He said that the reserves created by the company out of income to cover contingents was sufficient to offset the deficit for the period reported and expressed the belief that because of liquidation of stocks effected and lower manufacturing costs, through reductions in prices for raw materials, wages and overhead expenses, made possible by increased production, the latter half of 1921 would show substantial improvement.

APPEAL TO WEEKS FOR STEEL AWARD.

WASHINGTON, D. C., Sept. 13.—Employees of the Bethlehem Steel Co. at

Bethlehem, Pa., will appeal to Secretary Weeks to set aside the decision of Assistant Secretary of War Wainright that the



Seven Simmons College Girls Have Been Cruising the Country This Summer on Unique Venture—When They Complete Their Vacation Tour of the East They Hope the \$2,000,000 Endowment Fund Which Their Alma Mater Is Out to Raise, Will Be Richer by Virtue of Their Efforts and Enterprise.

War Department has no legal right without action by Congress to pay the one and a half million dollar claim of the employees under the award of the National War Labor board. This announcement

growing out of a complaint filed by the machinists against labor conditions in the Bethlehem machine shops.

TRUCKS MUST HAVE MIRRORS.

New Law Said to Be Designed with View to Decreasing Accidents.

DETROIT, Sept. 12.—Mirrors must now be carried on all motor trucks of more than 1½-ton capacity on country roads. All cars, when parked within the city limits of any city, must display both rear and front lights. There are several other minor changes in the laws regulating lights and license plates.

The idea of the act requiring all heavy trucks to be equipped with a mirror is to do away with what drivers of passenger cars call "hogging the road." It is their contention that the drivers of slow-moving trucks have the habit of getting in the middle of the road and staying there. The noise and rumble of the trucks, they declare, prevents their drivers from hearing horns or warning signals, and the result has been that drivers of pleasure cars have been forced to trail trucks. Sponsors of the new law pointed out that it would be obviously wrong to increase the speed limit without taking some step toward removing the prohibition on speed placed on the road by trucks.

The majority of truck drivers in this city express themselves as being wholly in favor of the new law and will undoubtedly abide by it.

CHURCH OPERATES A GARAGE.

NEW YORK, Sept. 10.—A church in New York City has solved its financial problem in a measure by the operation of a garage which is made use of by its members. The congregation consists of persons who come from a distance generally and during the services the street in front of the edifice was blocked with cars. Now they are stored in the garage at a nominal rate and the money collected in this manner and that received from repairs and accessories helps very materially in meeting the expenses of the church.

was made Sunday by the International Association of Machinists.

The announcement said that if Secretary Weeks did not "see his way clear to overrule the opinion" of the assistant secretary the employees would request

Building of Highways Gives Work to Many

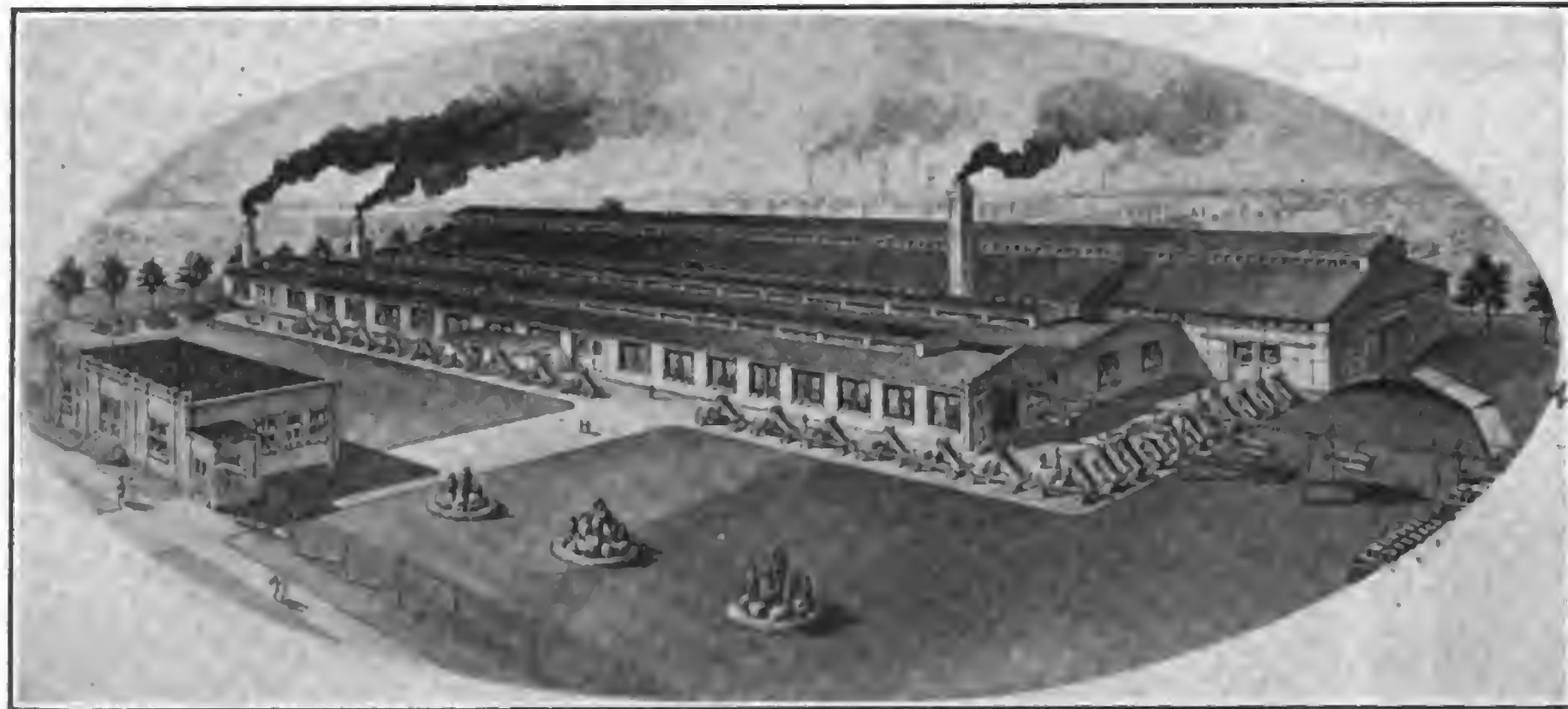
Thousands Will Benefit Through Fall and Winter Programme of Road Building.

NEW YORK, Sept. 10.—Careful estimates based on reports of the Asphalt association show that the impetus given street and road building in the United States during April, May, June and the first two weeks of July has had an appreciable effect on the unemployment situation. Highway work in 39 of the states has already given employment to 376,000 men. The labor most benefitted is that of the unskilled type.

The State of Washington has set a splendid example by arranging to go a step further and extend its highway construction programme well into the winter in order to help the unemployed. After inspecting the highway system in his state, Governor Louis F. Hart declared that road work in eastern Washington will afford employment to thousands in the fall and winter.

MOST ACCIDENTS ON STRAIGHT ROADS.

BALTIMORE, MD., Sept. 15.—Contrary to general belief, more accidents occur on straight highway stretches than at curves or road intersections, according to Harry D. Williar, assistant chief engineer of the Maryland State Roads commission. During the past two months Mr. Williar has been keeping a



New Body Plant of Wood Hydraulic Hoist & Body Co. at Detroit, Mich., Believed to Be Largest Factory in World Devoted Exclusively to Steel and Wood Truck Bodies.

record of highway accidents in his state and he says that a majority of them are due to speeding, failing to give right of way and bad driving. Sixteen accidents occurred on the Baltimore-Frederick highway in one week.

NEW BODY PLANT OF WOOD HYDRAULIC HOIST CO.

DETROIT, MICH., Sept. 10.—Gar Wood, head of the Wood Hydraulic Hoist & Body Co., Detroit, Mich., announces that the new steel truck body plant,

TEXAS AUTO FIGURES SHOW FALLING OFF.

SAN ANTONIO, TEX., Sept. 14.—Automobile registration in the 253 counties in the State of Texas for the first six months of 1921 total 412,332, as against 430,320 for the entire year of 1920. For the first six months' period of the present year 102 counties showed an increase in registration of 11,830, while 147 counties showed a decrease of 29,818 registrations. There are six Texas counties, Cochran, Crane, Hockley, Kerr, Loving and Yoakum, in which no automobiles have been registered thus far this year.

which will be operated in connection with the manufacture of Wood-Detroit hydraulic hoists, will be ready for occupancy about Sept. 1. This is believed to be the largest plant in the world devoted exclusively to the building of steel and wood truck bodies. The main building is of structural steel and brick and is 350 feet long by 80 feet wide. The total floor space is approximately 55,000 square feet and the buildings are on a seven-acre tract, which gives ample room for expansion and storage.

The factory is located in Highland Park, adjacent to the immense Ford and Maxwell plants. The transportation facilities are excellent and railroad tracks extend into one wing of finished body de-

partment, allowing seven cars under the roof at one time. Loading and unloading is facilitated by a five-ton electric crane running the full length of the building.

The location of this body plant in Detroit, midway between the East and Middle West, enables the plant to supply steel bodies at a considerable saving in freight rates.

At the present time Mr. Wood maintains three manufacturing plants in Detroit, one in Milwaukee, a Canadian factory at Windsor and an assembly plant in Paris, France.

Price of Crude Oil Is Reduced on Coast

Increased Production Combines with Slackening Demand to Lower Figure—Gasoline Sales Normal.

LOS ANGELES, CAL., Sept. 15.—Recent action by Standard Oil Co. of California has reduced price of crude oil 25 cents a barrel and of gasoline two cents a gallon. The reductions affect all of the Pacific Coast states. On May 15 last the company announced a similar reduction.

The new quotations for California crude range from \$1.10 to \$1.55 a barrel, according to specific gravity, compared with prices of \$1.35 to \$1.80 announced in May. In March, 1917, just before the United States entered the war, prices ranged from 73 cents to \$1.07 a barrel.

The readjustment of oil prices in the Pacific Coast states has been long delayed, compared with readjustments in other fields. This is believed to be due to the prevailing feeling on the Pacific Coast that that part of the country is entirely isolated from the rest of the United States as far as the oil industry is concerned, as demand in that section has almost invariably exceeded production.

Recently, however, there have been numerous changes in the situation. Demand for crude oil and other oil products has fallen off in the West, forcing the readjustment of prices.

An official of one of the large oil companies, commenting on the decline in California crude prices, ascribed the reactions to an increase in production, coupled with the slackening demand which, if continued, would result in a large oil surplus. It was estimated that the increased supply of crude was no larger than would have been needed to take care of the normal demand if consumption had continued at the rate established in 1920. But with the exception of a good demand for gasoline, there has been a decided reduction in the consumption of oil products as a result of the industrial reaction.

HERBERT BECOMES DENBY'S GENERAL SALES MANAGER.

DETROIT, Sept. 15.—A report from A. S. More, president and general manager of the Denby Motor Truck Co., announces the appointment of William H. Herbert as general sales manager of the company, succeeding L. B. Graham, resigned. Mr. Herbert is one of the oldest members of the Denby organization, having filled such posts as special field representative, assistant sales manager, and more recently as manager of the company's Detroit branch.

GASOLINE ADVANCED IN GEORGIA.

The wholesale price of gasoline has been advanced to 21 cents a gallon in the state of Georgia, an increase of one cent a gallon.

Noticeable Increase in Steel Buying Due to Automotive Industry

Central Western Mills Show Marked Improvement—Urgent Call for Early Delivery Comes from Detroit Manufacturers.

NEW YORK, Sept. 12.—The Iron Age says: The hope of the steel trade that the fall will bring a noticeable increase in buying amounts to something less than confidence as yet, but there are indications of a slowly expanding demand for some forms of finished steel. The best basis for better expectations is an increase in the number of orders, coupled with a more urgent call for early delivery. Producers of steel see more signs of the depletion of stocks that have long stood between them and anything more than a hand-to-mouth operation, and are encouraged to look for a gradual decrease in the scale of their losses.

The Steel Corporation followed more promptly the last reduction of the independent companies than those coming earlier. It will take a considerable increase in operations to give any approach to economical production. The rate of steel ingot production is slightly larger this week at several important plants. In the Chicago district the Wisconsin Steel Co. shows the most marked improvement, running at 40 per cent. of capacity. Central western mills find more activity in automobile steel than in any other direction. Several Detroit plants will operate at the present high rate through September. The Ford Motor Co. placed 2500 tons of light plates at Youngstown and a like amount went to another mill.

The sheet market is more active, some buyers making their first purchases in months.

4000 MILES OF STATE ROADS BEING REPAIRED.

CLEVELAND, O., Sept. 12.—More than 4000 miles of Ohio highways, in every county of the state, are being worked on by the maintenance and repair division of the state highway departments. The total cost of the year's operations will be about \$5,500,000, officials estimate.

Work is being done on 3800 miles of road, for the maintenance and repair of which the state is responsible under contract. On a little more than 200 miles the state is not responsible, but is helping the counties to put the roads in passable condition for winter travel.

Work of this kind is typified by operations underway in Clermont county, where, in about 15 miles of the Sherman-Sheridan highway, extending east from Milford, there are three gaps, aggregating about six miles, that were not completed.

They have operated to prevent the full use of the road, but as the county would not appropriate its share for complete construction, the highway department ordered that they be made passable and sent men, material and equipment to do

the work. It will call on the county for part of the money from its repair fund

PUT INSURANCE BAN ON FORDS.

NEW YORK, Sept. 4.—Several large insurance companies issuing policies on motor cars, it became known today, told the recent Automobile Underwriters' conference that they had decided not to insure Ford cars any longer because of the fluctuations in Ford prices and the singular attraction that Fords seem to have for automobile thieves. The companies have not combined in the embargo, but have made their decision individually. The number, however, is growing daily, and it was said to be not at all unlikely that no local underwriters will take Ford risks within a few months. The companies, however, will not act in concert in this matter, because such action would savor of discrimination.

LONDON, ENGLAND, Aug. 15.—The Department of Overseas Trade of the British government announces that the next British Industries fair will be held in London and Birmingham, Feb. 27 to March 10, 1922. The London section will probably be held at the White City under the same condition as in 1921.

PACKARD A MONTH BEHIND ON ORDERS.

DETROIT, MICH., Sept. 12.—Figures which have been furnished by the Packard Motor Car Co. of Detroit indicate clearly the trend and force of the improvement. In the Chicago territory for example, July Twin-Six sales equalled those of the previous three months combined. Detroit retail sales for July totalled a quarter million dollars. And generally speaking this showing is representative of the other 325 Packard distributing points throughout the country.

On Aug. 19 the Packard factory was more than a month's production behind on Twin-Six orders, despite all preparations made to anticipate the increased demand that followed the July price revisions. On Aug. 5, both New York and Philadelphia were completely sold out of Twin-Six and Single-Six touring models. During the first half of August, Twin-Six orders ran 60 per cent. ahead of production.

The same condition prevails throughout most of the Single-Six market. Most points show decided increases in Single-Six business, with the demand leaning more of late to the closed types, sedan and coupe. Single-Six sales figures for the first 10 days of August show a 78 per cent. increase over those of the first 10 days of July.

Similar improvement is also shown by truck sales. Figures for the first half of August disclose a 59 per cent. gain over those of the first half of July.

C. B. SEGER TO BE UNITED STATES RUBBER CHAIRMAN.

NEW YORK, Sept. 10.—C. B. Seger, president of the United States Rubber Co., will be elected chairman of the board when the directors meet next month, according to reports circulated in the financial district. Mr. Seger also is expected to retain the position of president. First reports had it that he would be made chairman of the board to succeed the late Colonel Colt, and that a man not connected with the company would be elected president.



This Photograph, Snapped Just Outside Town of Doruma at Southern Edge of Great Desert—Only Means of Transportation for Many Thousands of Miles of Great Continent—American Ingenuity Will Eventually Relegate These Camels to Background.

Increased Truck Sales Sign of Business

Greater Volume Shows That Business Is at Last on Upward Trend.

ALMA, MICH., Sept. 10.—That the motor truck industry is one of the best barometers of general business conditions is the opinion expressed by Colonel Frank E. Smith, vice president and general manager of the Republic Motor Truck Co., Inc.

"Reports indicate that where general business has been slack, motor trucks have been laid up for want of work, but that in sections where business conditions have recently improved, motor trucks are being bought and kept in constant service," said Colonel Smith. "Never before, to our knowledge, has any condition shown more clearly the vital part which motor trucks are playing in the country's transportation system.

"For months past the geographical record of our Republic truck sales has coincided with the general business chart. The fact that the Republic Rapid Transit, our new $\frac{3}{4}$ -ton truck, built for rapid transportation, has met such a splendid response in various parts of the country, is a most gratifying indication that general business conditions are decidedly on the upward trend.

"The fact that we are daily receiving repeat orders for carloads of the Rapid Transit model from all sections of the country, shows a trend which we consider a definite national tendency toward business revival."

CONSTRUCTION OF ROAD SURE.

Will Begin Work on Highway from Bakersfield to Paso Robles.

BAKERSFIELD, CAL., Sept. 13.—The immediate beginning of work on at least one unit of the proposed paved highway which is to connect Bakersfield with Paso Robles and the Pacific ocean on a direct westward line was promised unequivocally by the California Highway commission to delegations representing Kern and San

FRENCH ROAD-BUILDING POLICY.

Of 33,000 miles of French roads in need of repairs at the close of the war, 13,620 miles have already been improved and 2200 miles have been completely and permanently repaired, according to figures announced by the French government through the Bureau des Ponts et Chaussees. In making these repairs the French government is adhering to a policy similar to that laid down by the United States Bureau of Public Roads and now being insisted upon by members of the legislature in various states—a policy of open competition between all types of construction. Experiments are being made with all types of pavement and composition road surfaces, such as concrete base with asphalt surface, black base with asphalt surface and macadam with bituminous surface, are being put down to a greater degree than ever before by the French authorities. At Givers a test is being made with two miles of a new composition developed in Italy. Many composition surfaces are being put down in the Rhone Valley.

Luis Obispo counties at a conference called by the commission in Sacramento, according to Charles F. Johnson, secretary of the Kern County Chamber of Commerce, one of the conferees who has just returned from the capital.

Chairman Darlington of the commission declared that practically all of the \$1,600,000 allocated for the construction of the road is now available.

Harry E. Gelb was recently appointed to the post of manager of the Chicago office of A. Schrader's Son, Inc., Brooklyn, N. Y.

Dedicate Los Gatos-Santa Cruz Road

San Francisco Motor Car Dealers Take Part in Opening Ceremony.

SAN FRANCISCO, CAL., Sept. 13.—The official opening of the new Santa Cruz highway, an event which means much to the automobilists of this vicinity in that it will afford motorists an all-year-round opportunity to visit this city by the sea, 79 miles distant, was recently celebrated and a gala day was made of the occasion. The chambers of commerce of the different cities along the line of parade vied with each other to make the day one long to be remembered by motor-dom.

The members of the San Francisco Motor Car Dealers' association were the invited guests and upon them fell the honor of opening this new piece of highway. Fifty automobiles, filled with overseas men, comprised a part of the San Francisco party.

The Santa Cruz and Santa Clara chambers of commerce made the trip to San Francisco in 200 automobiles accompanied by a band and escorted the local party down to Santa Cruz, where suitable entertainment was provided.

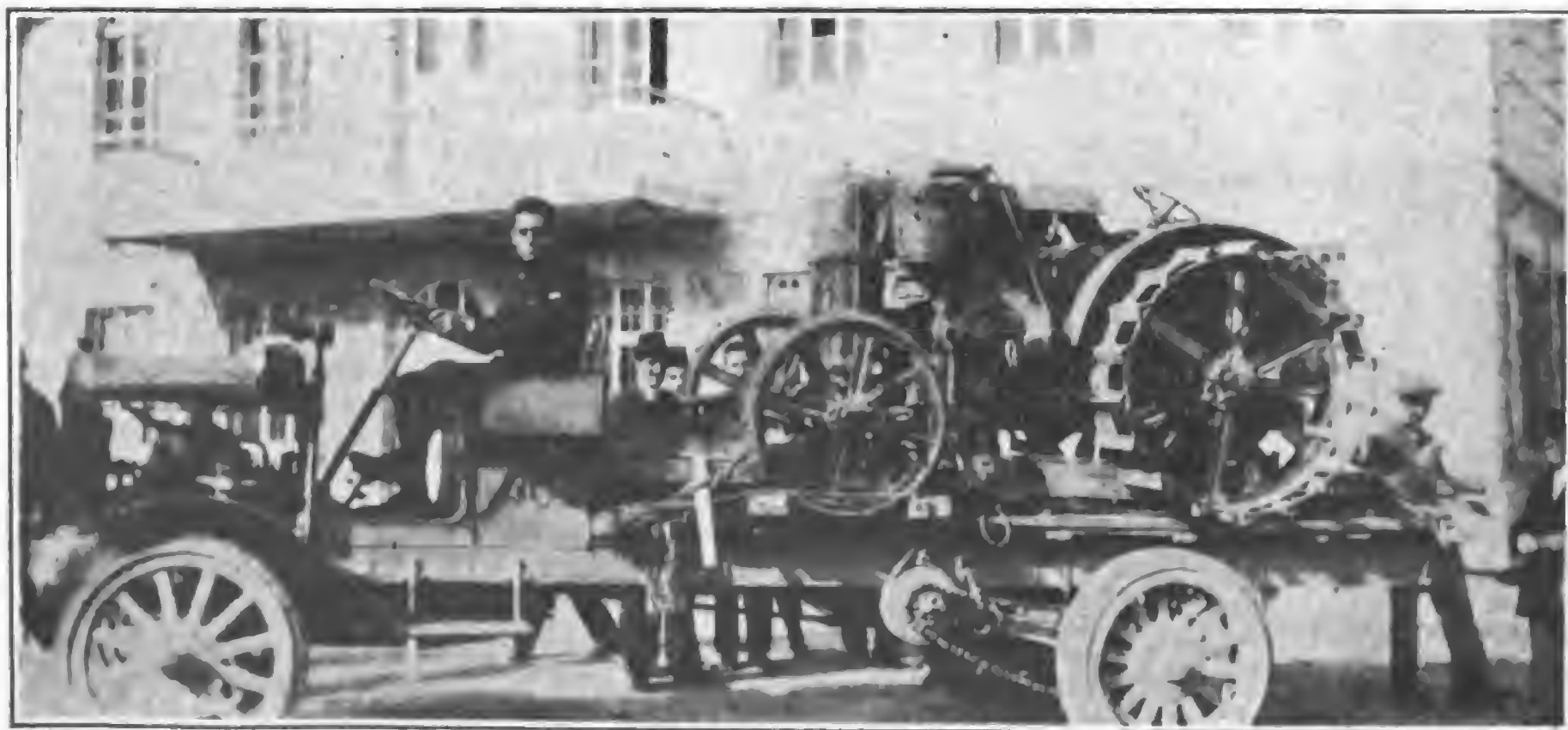
The itinerary of the trip was as follows: Leaving Santa Cruz at 7 a. m. Friday, Aug. 26, arriving San Francisco at 11:30, where the San Francisco delegation joined them at the Civic Center. Under police escort the parade left the Civic Center at 12:30, proceeding down Market street to New Montgomery, to Mission, down the peninsula over the new highway, arriving at Santa Cruz at 5:15.

The official party was met and escorted over the new highway by 20 traffic officers of Santa Cruz and Santa Clara and San Benito counties, who adhered to the new speed limit of 20 miles per hour set by the state highway commission for this new highway. No automobiles were permitted to run on this highway until the official run was made.

Though only a few days have passed since the opening, the new road is already being extensively used.

NEW HIGHWAY PLAN IN LASSEN COUNTY.

SUSANVILLE, CAL., Sept. 12.—The supervisors have evolved a plan of road maintenance and construction believed to be unique in the history of road construction in California. Under the new plan the supervisors will set aside a certain sum of money for the improvement of a road through the county, irrespective of the supervisorial districts through which it chances to pass. This will eliminate the present unsatisfactory conditions where a part of a road will be repaired by one supervisor, but the other part of it in another district is left in bad condition.



Reo Two-Ton Truck, Operated by American Relief Association, Delivering Tractor at Interior Station in the Mesopotamia Section.

Haulage Figures Given by Lumber Operators

Show Power Vehicles Cost Less Than Horse in Logging Industry.

MINNEAPOLIS, MINN., Sept. 15.—The actual cost records of the horse compared with the records of the motor vehicle in several recent carefully checked tests, show that the use of trucks and tractors cuts the cost of log hauling as high as 70 per cent.

These figures were presented by practical woodsmen during the recent convention of the Woodlands section of the American Paper & Pulp association, who have been forced to substitute power operations for animal hauling by the far greater economy of the motor hauler.

The figures given by these operators apply equally well to lumber operations as to woods camps of the paper industry, for the hauling problem is identical in both types of cuttings.

O. L. E. Weber of the Watab Paper Co., Sartell, Minn., told of the extensive use last winter of tractors, under conditions where horses could not be used at times, but he made his comparison of costs on the basis of horse equipment on passable roads. He figured that a 10-ton tractor would do the work of 36 horses, and a five-ton truck of 16 horses. He made his cost comparison on the basis of 5000 cords of pulp wood, 35,000 tamarack and cedar ties, 30,000 cedar posts and 750,000 feet of Norway pine where he actually used tractors, but where he estimated the cost of horse operation under conditions of previous years. The cost of the job with tractors and trucks was \$3150. The cost with horses would have been \$10,100, including cost of equipment in both cases.

Stanley H. Sisson of the Racquette River Paper Co., operating in Northern New York, told of hauling 23,000 cords of 16-foot peeled wood 10 to 12 miles, an average of 65½ cords per day per tractor, handling 15,000 cords in 38 days. His comparison with horse equipment was as follows: One team hauling nine cords per trip, double headers at landings, costing \$15.50 per day, or \$1.72 per cord. The tractor cost, on a basis of 60 cords, with two trips daily to landings, was \$43.06 per day, or \$.717 per cord. He, like the other woods superintendents, said that care in repairs and maintenance of tractors was vital to their successful operation, and also urged care in dispatching trains or sleds or wagons, with extra equipment being loaded or unloaded while the machine was on the road.

C. L. Tolles of the Phoenix Manufacturing Co. of Eau Claire, Wis., giving figures for a motor truck, with long trains of sleighs, said that the motorized cost was only about one-quarter that of horse operations.

E. A. Drott of Drott & Newall, handling another Wisconsin logging operation, said his motor hauling cost him \$1.50 per thousand feet of lumber, board measure,

FORD ANNOUNCES RECORD OUTPUT.

DETROIT, MICH., Sept. 13.—A new production record for a three months' period was announced Friday by the Ford Motor Co. The total production for May, June and July is given as 317,586 cars and trucks.

while natives using horses were forced to pay \$10, and then failed to get all their timber out. This was on a 10½-mile haul and on a 7½-mile haul the motor equipment cost \$1 per thousand, as against \$7 for horse hauls.

THOMPSON JOINS NEW AXLE FIRM.

LOS ANGELES, CAL., Sept. 13.—S. H. Thompson, former University of California athlete, and a member of the organization of the Ruckstell Sales & Manufacturing Co., has been transferred from the Los Angeles office of the company to the plant at Berkeley, where the Perfecto two-speed axle is produced. Mr. Thompson is well known throughout the state and until recently, when he resigned to become associated with the Ruckstell organization, was associated with the Ford organization in the sales department, one of the largest Ford distributing concerns in California.

SILLO MANUFACTURERS TO MEET OCT. 15.

CHICAGO, Sept. 11.—Members of the silo department of the National Implement & Vehicle association are to hold their annual meeting in the Auditorium hotel on Oct. 15. Selection of this date was determined largely because it is the wish of silo manufacturers to attend the 28th annual convention of the National Implement & Vehicle association, which concludes the 14th.

Find Unique Use for Motor Truck

Commercial Hauler Used to Close Gate of Great Water Main.

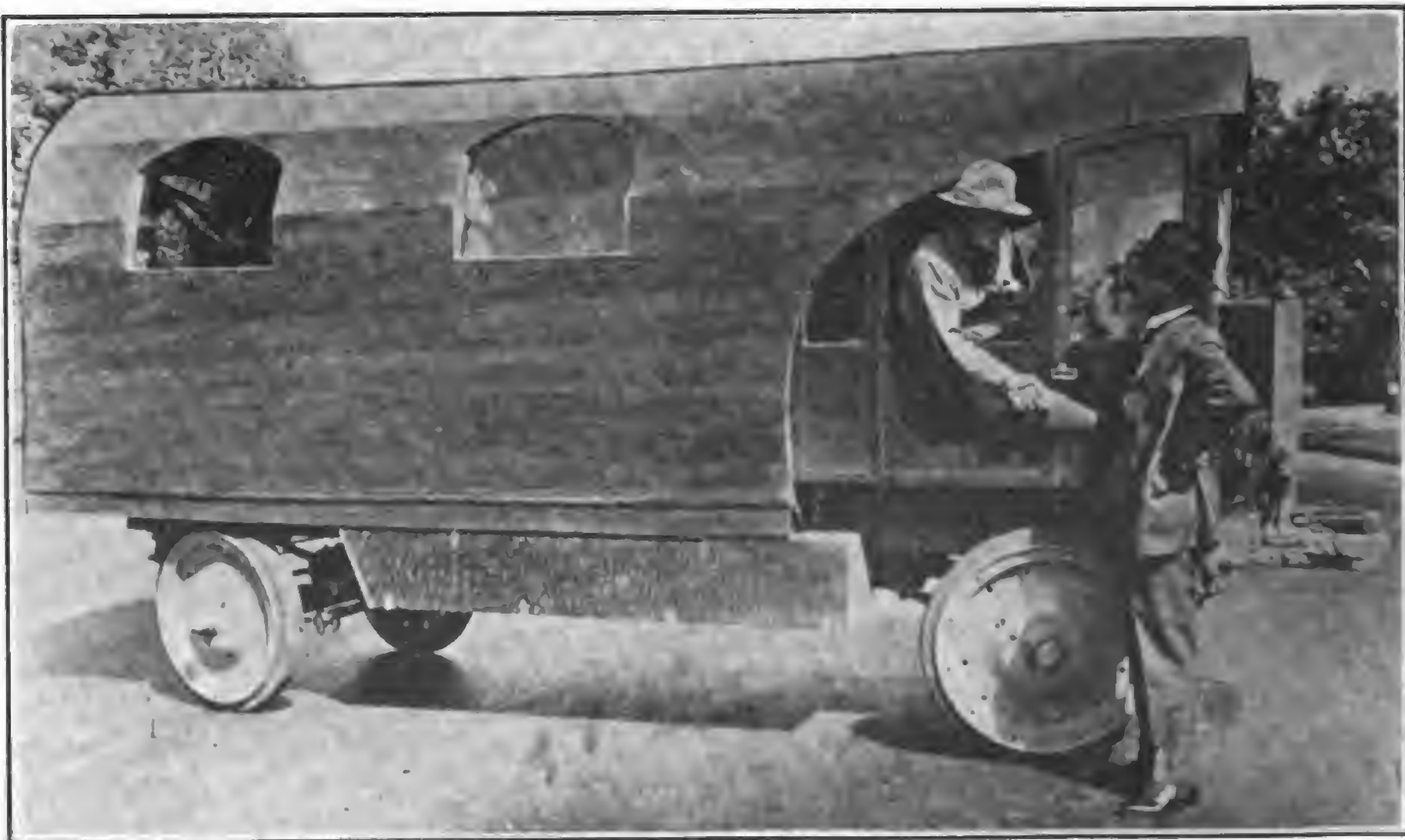
DETROIT, MICH., Sept. 12.—Opening and closing the big water gates in the 48-inch mains in the city of Detroit requires hard work and from four to eight men were formerly employed by the water commission to do the work. If the gates were in good working order, four men could do the job, but if they happened to be somewhat stiff it took eight men to get them started. Sometimes the gates could not be closed until thousands of gallons of water had been wasted. Property was sometimes damaged by the flood gushing forth from the 48-inch mains. Foundations for new buildings have been washed out several times by a break in a water main which could not be stopped immediately.

Recently a two-ton Packard truck, owned by the Detroit Water commission, was equipped with a power key, designed to open and close the water gates. The truck is capable of a speed of 20 miles an hour and the power key is operated by a power take-off from the transmission.

Only two men are required on the truck in its daily work. It reaches the gate boxes speedily and shuts off the water in a fraction of the time required by laborers operating a hand key.

It requires from 175 to 225 turns to open or close one of the gates on the 48-inch mains in Detroit.

The D-A Lubricant Co., Inc., Indianapolis, Ind., has assumed full charge of the sales of its well known lubricant. The Dix Oil Products, St. Louis, was its former sales representative and distributor. L. C. Slicer is to have charge of the sales department and will also direct the advertising.



Unique Truck Body—This Man Has Taken a Section of Redwood Tree and Made It Into a Travelling Home—We Should Not Like to Predict That His Example Will Be Followed to Any Great Extent.

Railroads Are Requested to Lower Rates of Own Volition

Freight Charges Found by Interstate Commerce Commission to Be Both Unjust and Unreasonable—Should Be Dropped to Stimulate General Industry.

WASHINGTON, D. C., Sept. 13.—Freight rates on live stock in western and mountain Pacific territory were found by the Interstate Commerce commission today to be both unjust and unreasonable, but the commission suggested to the railroads that the present rates should be reduced voluntarily to 80 per cent. of the present rates, the reduction not to be less than 50 cents a hundred pounds. Rates as suggested may be published to become effective on not less than five days' notice the commission said.

Emergency reductions granted last May still are in effect, the commission said, and there is nothing to show that they materially increased traffic or that the present rates have appreciably reduced the movement of live stock which must be marketed as it matures.

"There has been some reaction in movement since 1918 and 1919, when the movement was greatest," the commission said, "but for 1921, judging by the figures for the first four or five months, it promises to equal or exceed that prior to the war."

The producers contended that reduced rates would stimulate the industry and help save it from ruin. The commission indicated that it proposed reductions on the basis.

STEEL CORPORATION TO MEET PRICE CUTS.

NEW YORK, Sept. 10.—Judge Elbert H. Gary, chairman of the United States Steel Corporation, has announced that the corporation would meet price cuts in sheet and tin plates instituted by independents.

He issued the following statement:

"When the subsidiaries of the Steel Corporation ascertain to a certainty that large and important independents, so-called, are selling at prices materially lower than those which have been heretofore announced, our subsidiaries

PAVED WITH SILVER AND GOLD.

SEATTLE, WASH., Sept. 13.—Every person who passes along the state highways, running between the towns of Valley and Chewelah, 10 miles to the north, is literally travelling over a silver highway, which, were it to be run through the mill, would net thousands of dollars in silver bars, according to authentic reports.

In building the highways the contracting company opened up a quarry of quartzite, which was crushed and spread over the road as a macadam surface. When the roadway was built some curious person took samples of the bed to the assayer and learned that perfectly good silver ore, running \$2 or better a ton, with traces of gold, had been used.

The job called for something like 7500 tons of the ore, which makes the silver in the road bed alone worth \$15,000.

meet the new prices. They do not precipitate or lead in establishing lower prices, for they are aware that the prices which have prevailed for some time past are lower than the actual cost of production by most, if not all, the producers."



LAND FLEETS OF THE FUTURE.

A dozen Twin City 12-20 tractors cutting a 42 foot furrow and turning over 120 acres per day. This remarkable picture was taken in August near Rochelle, Ill., on one of the extensive farms of the Rochelle Canneries, Inc., who put 15,000 acres in peas alone. The Rochelle Can-

neries own a fleet of 16 Twin City 12-20's, using them for plowing, discing, harvesting and hauling, as well as belt work on the pea vinery, which run from daylight till dark during the pea pack. As the Rochelle Canneries raise their own crops they farm on a big scale.

TRUCK OWNERS SHOULD TAKE WARNING.

HARTFORD, Sept. 15.—To combat legislation, motor truck owners must have a thought for the road and its traffic limits.

The State of Connecticut has already passed a drastic motor truck law which limits the loads carried, and state officials are following the workings of this law closely, stopping trucks which they have reason to believe are overloaded and weighing the load. If found to be in excess of what is supposed to be the capacity of the truck the excess is unloaded beside the road after weighing and the truck is allowed to proceed to its destination. Such methods are teaching motor truck owners in the nutmeg state to be sure that their trucks are not overloaded before starting on a trip. The reason for this motor truck law is self-evident from the fact that Connecticut has spent a large amount of the taxpayers money in the last 10 or 12 years in highway construction work and the continual use of these highways by overloaded trucks has done a vast amount of damage.

Many other states are considering similar laws to curb this evil, and motor truck owners and drivers will do well to heed the advice of men high in authority in state affairs and go slow when thinking of overloading their trucks, as the results, if continued, may result in a similar predicament that Connecticut truck owners now find themselves.

Haste and Greed Often Causes Overloading.

The result of overloading is often caused by either the shipper or truck owner or both desiring to ship as much material as possible in a given time with whatever equipment is at hand. Haste in shipping often enters into the problem, and overloading results, with consequent damage to highways that were never intended for such overloads, the small tires of the light weight machine cutting into the road surface and damaging it to such an extent that extensive repairs are necessary.

NEW ADVERTISING MANAGER FOR MOTOR CAR FIRM.

DETROIT, Sept. 12.—Verne E. Burnett has been appointed to take charge of the advertising department of the Cadillac Motor Car Co. at Detroit. Mr. Burnett joined Cadillac after resigning from a similar position with the Liberty Motor Car Co. at Detroit. Previously, he was a newspaper man, having worked on the Detroit News and the Detroit Free Press and, during the war, on the "Stars and Stripes" in Paris.

BUSINESS INCREASING SAYS GENERAL MOTORS.

PONTIAC, MICH., Sept. 10.—The General Motors Corporation, through President W. L. Day, has announced that the company now has on its books more orders than at any time since March, 1920. Prospects, he states, are the best in many months for the resumption of production on a normal basis.

Motor Truck Stabilizing Factor in Highway Transportation

World Economic Conditions Will Force Realignment of Transportation Facilities Is Prediction Made by F. W. Fenn at Canadian National Exhibition.

TORONTO, Aug. 29.—“World economic conditions have brought about a readjustment of commodity values everywhere,” declared F. W. Fenn, secretary of the National Motor Truck committee of the National Automobile Chamber of Commerce, in an address today before the directors of the Canadian National Exhibition. “A buyers’ market is at hand; costs must be hewn to the line. One of the old, fundamental theories of successful merchandising that is being recognized today, therefore, more than ever before, is a quick turnover of stock; because this permits smaller margins of profit, quick and economical transportation must be provided.

“This is a plea, therefore, for the development and the fostering of motor transportation in the name of lower prices and a better knit Canada,” continued Mr. Fenn. “Fullness of commercial prestige can only be had when the people of Canada are awakened to the possibilities presented by the development of a motor transport system. Every dollar invested in the improvement of your highways will be a pledge of honor to the future commercial greatness and security of your country. The highways in the provinces will always be the main arteries for commerce and defense.

“The world is just awakening to the manifold advantages of highway transportation; evidence is to be had on every hand. Farmers show a gain of 68 per cent. in their individual efficiency as a result of the adoption of the automobile as a part of their transportation equipment. The extensive utilization of motor trucks by the eight railroads entering Cincinnati, O., made possible the release for the main line movement of the railroads, which is their permanent and profitable sphere of operation, 66,862 cars; the elimination of 300,000 switching cuts; the advancement of the freight movement 52 hours and a saving of 30 per cent. in labor through the elimination of the rehandling of tonnage.

“Almost over night the motor truck has therefore become a tremendous factor in the distribution of our nation’s food supply. Think of 6800 head of hogs, valued at \$200,000, being hauled into Indianapolis stock yards in one day by 500 motor trucks. St. Joseph, Mo., is receiving 2500 a day, while Omaha, Neb., received over 187,000 in one year. In these times of high living costs the saving of 43 cents per hog, or a total of \$13,760 a year delivered at the stock yard, is a big item. This is what is happening at St. Louis, as 1000 hogs are moved across the Mississippi river each hog-slaughtering day.

“The Bureau of Crop Estimates of the United States Department of Agriculture discovered, after an exhaustive series of

experiments with horse and motor-drawn vehicles, that the motor-drawn vehicle travelled 25 per cent. longer distance; made 183 per cent. more round trips; carried 48 per cent. more corn, 50 per cent. more wheat and 83 per cent. more cotton. This work was done at 45 per cent., 50 per cent. and 37 per cent. of the ton-mile cost of wagon-hauled corn, wheat and cotton respectively.

“The day of the power farmer is at hand. It is to him that you must turn in answer to the Dominion’s cry for greater

ROADS IN SOUTH ARE FLEECE-LINED.

IMPERIAL VALLEY, CAL., Sept. 15.—Cotton is being used for building roads in California now, according to a party of motorists who toured the southern part of the state in a Dodge Brothers touring car.

This very latest style of highway was discovered by the “Dodge” party while travelling through the Imperial valley. Off the main highways the roads of Imperial valley in the vicinity of Indio, Coachella and Mecca, and throughout the whole Imperial valley in general are notoriously poor, the constantly shifting sandy soil preventing the wearing of trails and country roads.

So in order to make satisfactory roads for the purpose of intercommunication the farmers have found that raw cotton makes an excellent surface for automobiles and teams alike. The road between Indio and the government experimental data farm is a splendid example of this type of highway and is typical of those which branch off the main highways leading to the farms and ranches.

The cotton pods seem to bed down in the sand of the road, giving good traction surface, especially for light automobile traffic.

production. For food will be the greatest factor in world economics for many years to come; it is the main spring of human action. The golden age of ample food for a minimum of effort has passed.

“The decision of the Milwaukee Street Railway Co. to utilize motor busses in the extension of its service into new districts is perhaps a forecast of the possible trend in this field of operation. Hitherto, street car companies have frowned on busses as nuisances to be driven off the streets wherever possible. The possibility of using busses for feeders to the regular

car lines has not occurred to very many operating officials as yet; but I safely predict that the bus will be used more and more extensively by street car companies in the very near future to extend their service into new residential and manufacturing districts.

“Does Toronto and the other major cities of Canada fully realize what the motor bus means to the principal cities in the states, many of which have difficulties that are even greater than yours? The advent of the motor bus has meant greater mobility; absence of car tracks and the extension of service into residential thoroughfares hitherto closed to the common electric carriers.”

DUPLEX ENLARGES RESEARCH DEPARTMENT.

LANSING, MICH., Sept. 15.—“It is true that the really remarkable way in which the merchants throughout the country have received the Duplex vocational selling plan has made it necessary for us to enlarge our research department in order to take care of the many requests for individual transportation surveys that are daily coming in,” states H. M. Lee, president and general manager of the Duplex Truck Co.

“It is very gratifying for us to know that this new department is receiving such sound support. We knew from the start that the work it was undertaking would attract wide attention, for never before, to our knowledge, has a truck manufacturer so thoroughly analyzed and surveyed a man’s business in connection with recommending a truck installation. We are constantly receiving letters complimenting us on the very high commercial and economic value of the new Duplex idea as applied to selling transportation.”

Mr. Lee also announces the fact that the Duplex Co. has added to its research department J. Paul Winchell. Mr. Winchell is a graduate of the University of Michigan and was associated with and trained under A. H. Blanchard, who is professor in highway transport engineering at the university. Mr. Winchell also received his degree in civil engineering and highway transportation engineering.

MOTOR TRUCKS ON THE FARM.

WASHINGTON, D. C., Sept. 12.—The following recently compiled statistics will be of interest to the automotive trade. They show that motor trucks were used on 13,551 farms in 1920, or about two farms out of every 100 in the United States as a whole. The number of motor trucks on these farms was 139,169.

The states leading in number of motor trucks on farms were: Pennsylvania, with 9372; New York, with 9259; Iowa, with 8910; Ohio, with 7319; Nebraska, with 6548; California, with 6416, and Illinois, with 6154.

Figures compiled by others show in nearly every instance a higher average of trucks owned by farmers, these estimates going as high as one truck to every five farms. It is probable that the above figures are near enough for general business purposes, however.

New Motor Truck Accessories

NEW SAFETY SIGNAL AND TAIL LIGHT.

Traf-O-Lite, the new safety device now being marketed by the Automobile Device Co., Cleveland, O., was designed to be a mechanically perfect "stop" signal and to serve at the same time as a tail light for any motor truck or passenger car.

The tail light is in the "neck" of the lamp and the license plate is illuminated through a water-proof glass opening. Forward rays, from the tail light bulb, light the red portions above and below the strip on which is the word "stop." It complies with all state laws and connects with the standard tail light wiring system of any car. The word "stop" appears simply as a dark strip and it is not visible until the danger signal is lighted.



The "stop" signal works off the foot brake. The instant the foot brake is applied a high-candlepower light just back of the outer lens lights automatically. The glowing red of the tail light grows instantly more brilliant and "stop" flashes on the dark strip in rays of blue green. The contrasting colors make the warning conspicuous even in rain or fog.

A new, simple and effective switch makes its action absolutely certain. A glass vacuum tube in a metal casing contains a ball of mercury. This tube is penetrated by the wires which form the "stop" circuit. The mercury remains at end of the tube until the depression of the foot brake changes its position. Then the mercury completes the circuit. The entire action is automatic and it requires no attention after being attached.

The retail price of Traf-O-Lite is \$8.50.

MECHANICAL CHASSIS LUBRICATION.

Chassis bearings of the slow-moving type, depend almost entirely upon compression grease cups or wick oilers for their lubrication and as these are often neglected for long periods of time the bearings wear excessively.

Manzel Brothers Co., 309-319 Babcock street, Buffalo, N. Y., recently placed in

production a device by which it is possible for the truck operator to lubricate the chassis bearings in a very short length of time from the driver's seat.

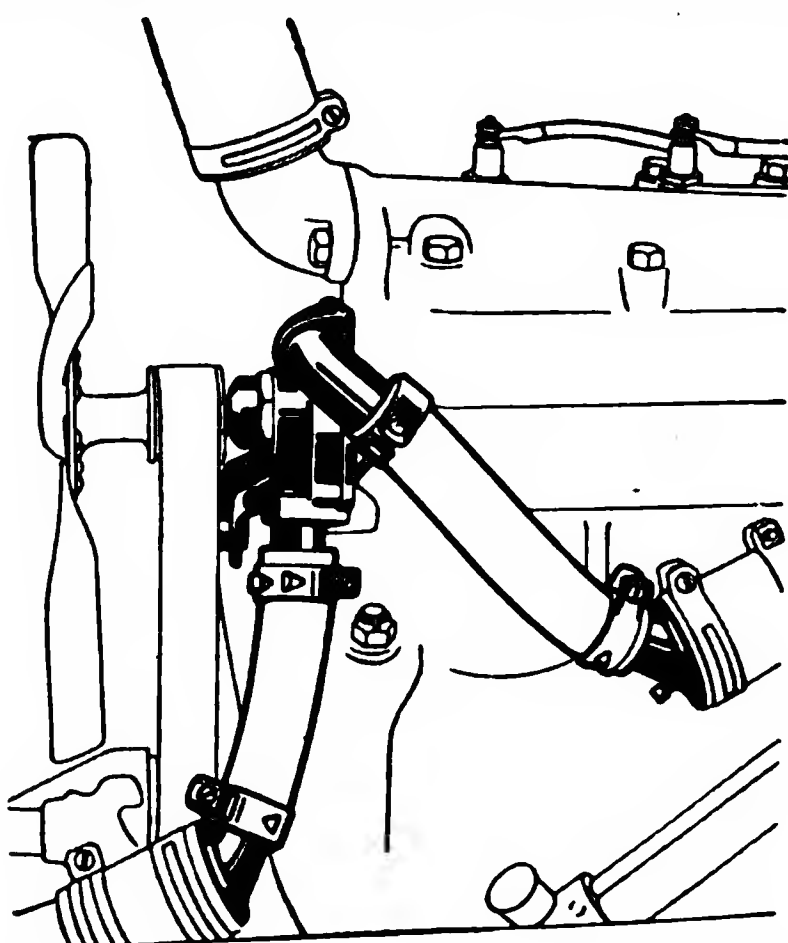
The device consists of a metal container fastened to the inside of the dash, under the hood, connected by a pull wire



to the front of the dash and by means of tubing to the bearings of the chassis. Pulling the rod in the front of the dash operates a series of pumping units with a tube or pipe leading from each which is later sub-divided into branches running to the bearings. Oil is forced under pressure to each of these bearings and positive lubrication is thus assured.

OSPECO CENTRIFUGAL WATER PUMP.

To replace the thermo-syphon water circulation system in the Ford car or truck with a positive pump circulation, the Michigan Products Co., Detroit, Mich., has placed in production a special centrifugal water pump, which is attached



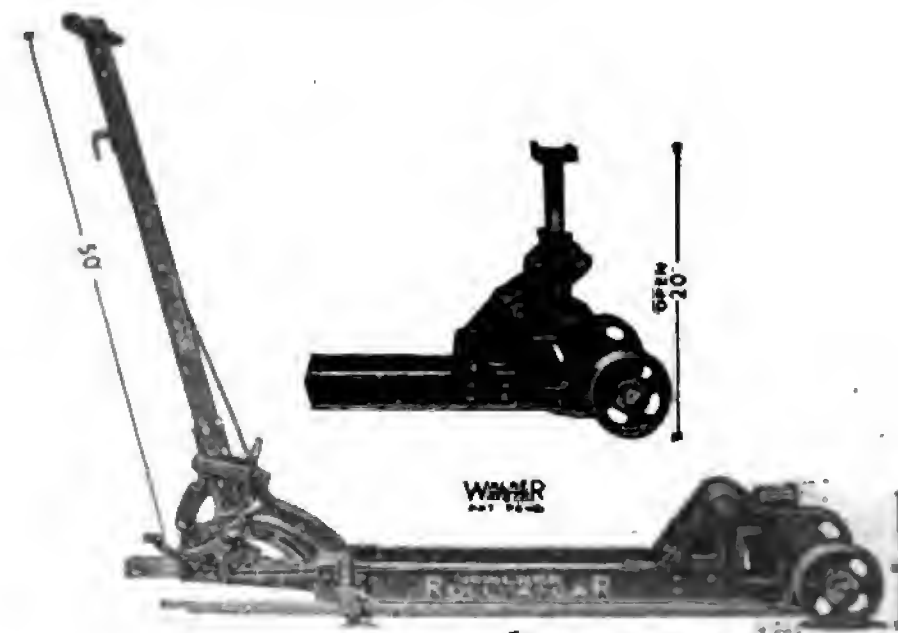
to the front of the Ford engine on the original fan support. The installation is simple as the standard fan bracket is removed and the belt slipped off. The fan is transferred from the fan bracket and slipped on the shaft of the Ospeco water

pump, tightened, and the whole assembly substituted for the original fan bracket.

The shaft and water circulator are the only moving parts and these turn with the fan according to the engine speed so that the possibility of wear taking place is of minor importance.

ROLL-A-CAR JACK.

For the convenience of the service station, sales room and garage, the Walker Manufacturing Co., Racine, Wis., has designed the Roll-A-Car Jack, which may be placed under either the front or rear axle and the car shifted to any desired position without the use of a turntable or without operating the car.

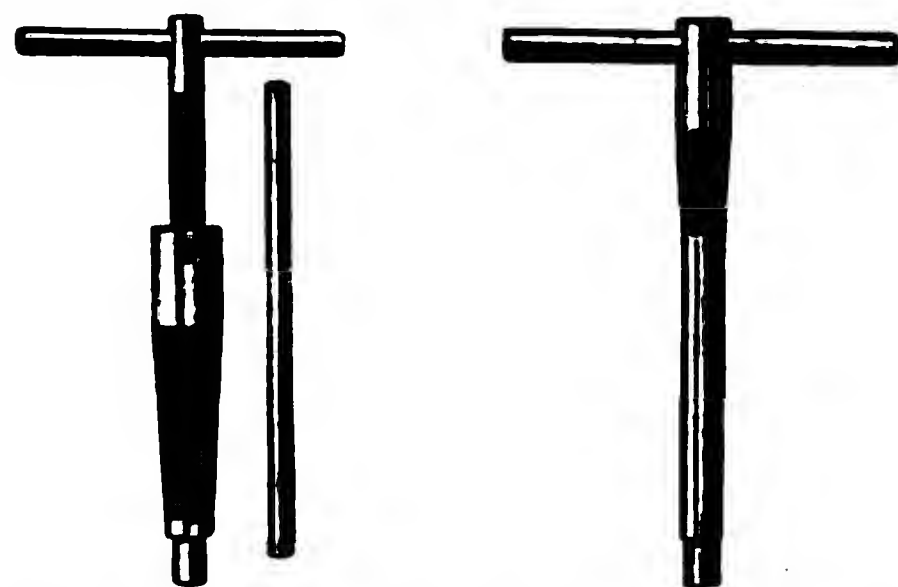


By means of a patented lifting device the car axle is easily raised to the desired height and the handle is then used for steering the end of the car.

Similar to other Walker jacks the Roll-A-Car is substantially made of high-carbon, heat-treated steel. It weighs only 120 pounds and has a capacity of 5000 pounds.

HOLLY BUSHING EXTRACTORS.

The Rosier-Howard Corporation, Hutchinson, Kan., is showing a line of tools especially designed to make the extraction of bushings easy for the repairer or for the service station. The accompany-

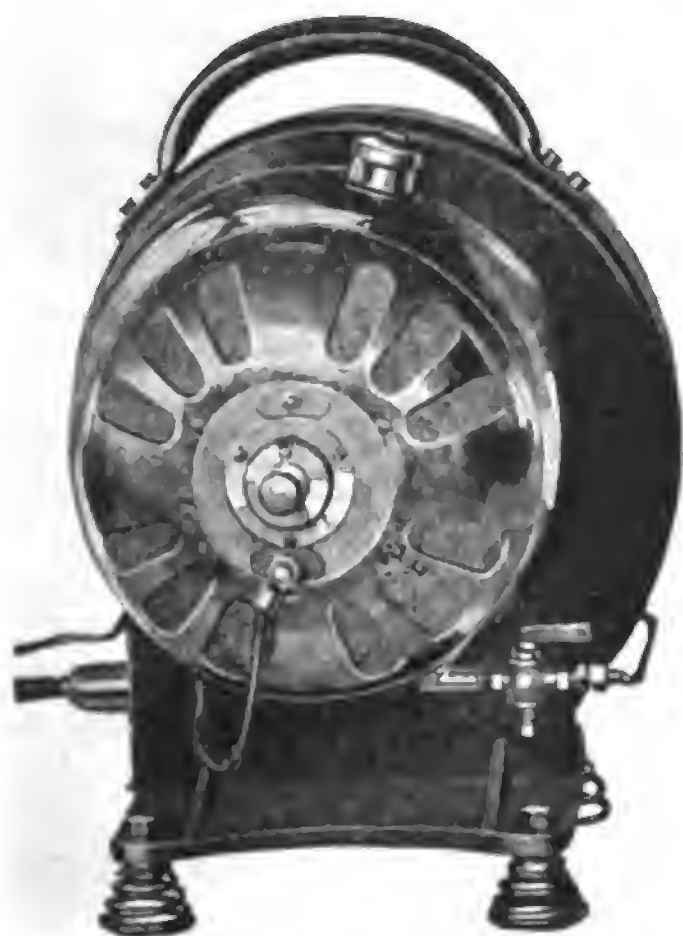


ing cuts show styles of tools Nos. 0, 1, 2, 3 and 4, 34B and 79 and 579 combination. They are also offered in sets so combined as to give the repairer only such tools as he actually needs. The standard set, with the 579 combination tool, will meet every requirement.

Practical Tools and Equipment

HOMELIGHT PORTABLE LIGHT AND POWER PLANT.

Designed to light electrically the shop, home or camp with efficiency, the Homelite portable electric light and power plant, manufactured by the Simms Magneto Co., East Orange, N. J., offers a light-weight power plant having sufficient capacity for the ordinary home, shop, garage or fleet station, as it is capable of handling 25 lamps of 20 watts each and will, in addition to lighting,



provide power for pumping, grinding, cutting wood, sweeping, running drill press or small lathe and the many other power duties about the shop or home.

A special foundation is not required for the Homelite engine and generator as four springs, one at each corner, takes up vibration and allows it to be mounted anywhere that a level space is convenient. A Simms water-proof high-tension magneto provides ignition regardless of the condition of the battery. Press a button and it starts and it will stop automatically at any desired time as this is accomplished by a small clock mounted on the front end.

SCHRADER TIRE VALVE SPARE PARTS AND ACCESSORY KIT.

Of special interest to users of pneumatic tires and tubes is the Schrader Universal tire valve and spare parts accessory kit manufactured by A. Schrader's Sons, Brooklyn, N. Y.

The kit may be easily carried in the tool compartment and supplies on short notice such valve parts as are needed for the valves of the inner tubes. Every accessory that has to do with a tire valve is included, and in addition a set of Kwik-On-An-Off dust caps, a set of rim nut bushings, five valve caps, a valve repair tool, a pump connection which permits of tire inflation without disconnecting the pump from the tire, a wrench for tightening the hexagon nut at the base of the



valve stem and a Schrader universal tire pressure gauge are included.

The kit is packed in an attractive leather-covered case and makes a very acceptable gift for presentation to any motor truck driver or motorist.

BENSON UNIVERSAL BATTERY CONNECTOR.

The Rosler-Howard Corporation, Hutchinson, Kan., has placed on the market the Benson Universal battery post connector, which greatly shortens the time required to make battery terminal connections in rental battery service. The connector is made of high-grade bronze



and is coated with lead to prevent corrosion. Statement is made that the Benson connector will fit any kind of cable terminals with which the car may be equipped.

Three sizes are available, No. 1-P fits the positive taper post; No. 1-N fits the negative taper post; No. 1-S fits either positive or negative straight post.

NEW CURTIS TWO-STAGE AIR COMPRESSOR.

The Curtis Pneumatic Machinery Co., St. Louis, Mo., New York office, 30 Church street, is placing in production a new line of two-stage air compressors, entirely original in design, and embodying the best features of the two-stage principle.

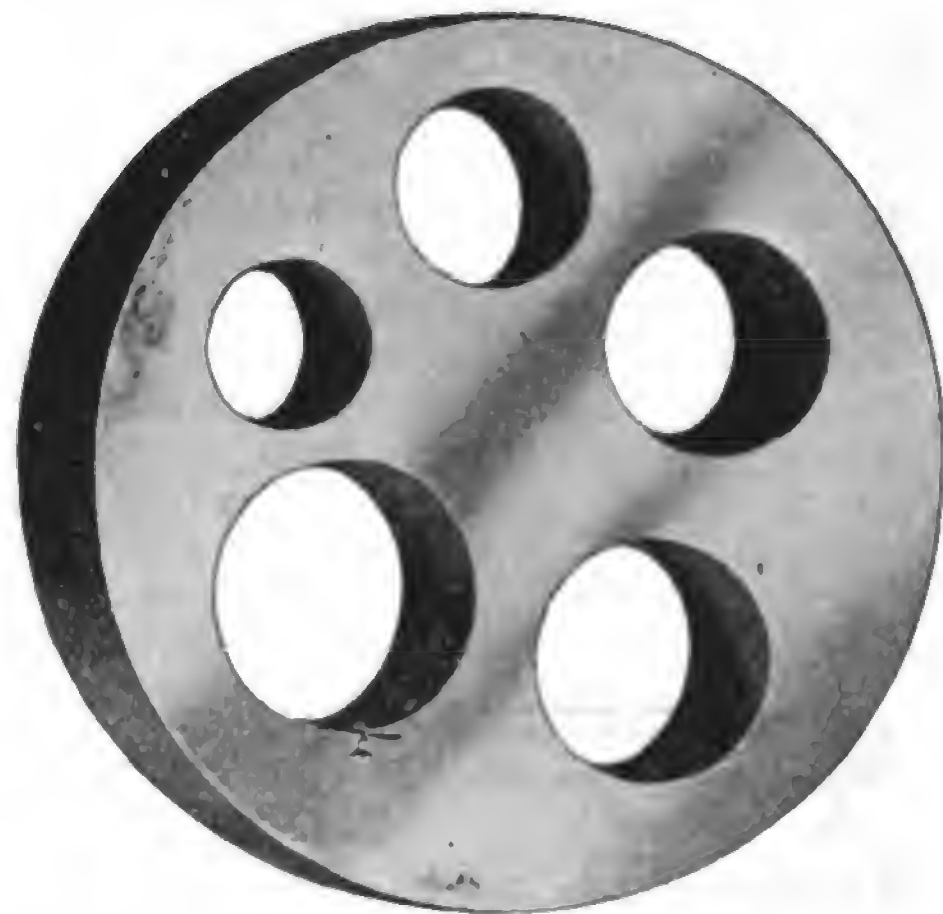
The two-stage machines retain not only



all of the good features of the single-stage compressor which the concern has so successfully produced, but have incorporated additional features which are exclusively Curtis, thereby emphasizing the advancement of compressor design.

WHITTAKER BATTERY POST BUILDER.

After repairing storage batteries it is always advisable to rebuild the battery posts in replacing the battery connectors and some form of post builder is necessary to allow the melted lead to assume the correct tapered shape. The Rosier-Howard Corporation, Hutchinson, Kan., has placed in production the Whittaker battery post builder, which is claimed to perform this work in a quick and positive manner. Five sizes are provided in a flat disc of the correct thickness for



the height of the post and the correct size opening is placed over the end of the post and melted lead run into the opening and, when cool, forms the tapered plug to which the connector is attached. The holes are so tapered that the top diameter of the smaller hole equals the bottom diameter of the next larger size hole. This series of diameters gives a perfect range of sizes, thus enabling the rebuilding of practically any battery post.

HURY-KANE SPARK PLUG CLEANER.

The Brewer Specialty Corporation, 2453 Wabash avenue, Chicago, Ill., is introducing a new type of spark plug cleaner which makes use of compressed air and sand.

The device is designed to clean spark plugs in a minimum of time and with the utmost effectiveness. It consists of a cup-shaped receptacle into which the spark plug is inserted when cleaned. There is a nozzle projecting up into the interior of the receptacle and a connection is pro-



vided to a compressed air supply hose at the bottom. The receptacle of the cleaner is kept filled with sand to within one-half inch of the top of the nozzle and the cleaning operation is performed by means of a series of miniature sand blasts.

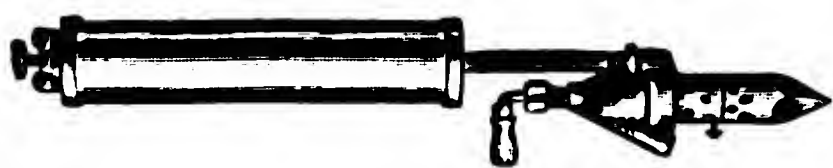
The operation of the sand under compressed air pressure quickly loosens the carbon deposits and the plug is then washed in gasoline to finish cleaning.

"EVERHOT" SOLDERING IRON.

A small, convenient soldering iron that may be carried in the tool box of the truck and that is ready for service by simply filling with gasoline, finds ready use both on the road and in the fleet station or service station.

The device is manufactured by Belfry & Craighead, Tribune building, Chicago, Ill., and consists of four units as follows: Soldering tip, burner with regulating valve, handle (or gasoline reservoir) and air pump.

Two soldering points, one large and one small, are furnished with each iron.



They are made from a special composition of copper and are attached to the end of the burner by means of set screws.

The burner is a one-piece brass casting designed to pre-heat the gas, obtaining the maximum heat units, and permitting perfect regulation of the flame. This special burner permits the use of the iron in any position in extreme cold or high winds.

The pump unit is placed in the end of the handle, is of the latest improved de-

sign and constructed in such a manner that it is easily removed to allow filling of the gasoline reservoir.

FYNO CREAM HAND SOAP.

Truck operators, as well as motorists, will be interested in a hand soap which will actually remove dirt, grease and grime from the hands and still leave them moist and pliable. Fyno cream soap is claimed to do this and is manufactured by E. Fougere & Co., Inc., 90-92 Beekman street, New York City.

This soap is especially valuable where

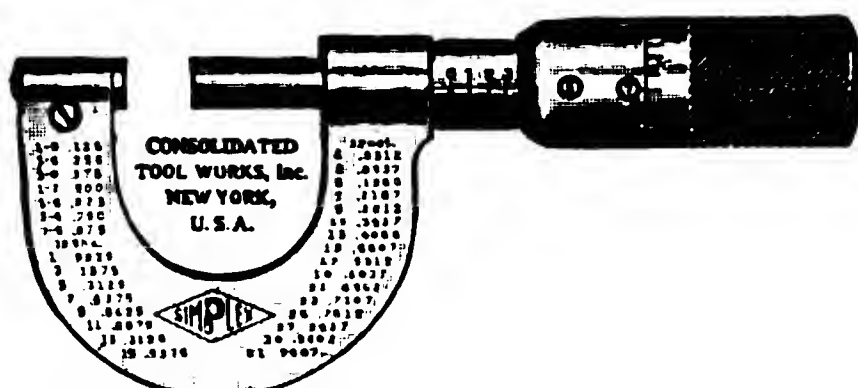


water is not available because with Fyno no water is required. All that is necessary is to rub a small quantity well into the pores of the skin and it is said that one will be agreeably surprised at the rapid manner in which it will loosen and remove every particle of dirt, black grease and grime, leaving the hands in practically the same condition as after using cold cream.

SIMPLEX SELF-READING MICROMETER.

The Consolidated Tool Works, Inc., 261 Broadway, New York City, is manufacturing a special micrometer embodying several special features. The tool is based upon standard design, but has advantage of self-reading numerals instead of old-style graduation. The exact reading is at all times in plain view and can be seen at a glance, saving time and preventing possible mistakes in reading lines in computing measurements.

There are only two working parts in



the direct reading unit of this micrometer and these are made of hardened steel, which makes it practically impossible for it to get out of order and reduces friction to a minimum.

The screw is manufactured by an entirely new process that enables the manufacturer to guarantee its extreme accuracy.

All Simplex micrometers are furnished with ratchet stop and lock unit.

R. & N. MAGNET RECHARGER.

Magnets of high-tension magnetos, after a period of use, lose their magnetism, or it is weakened to such an extent that the magneto's usefulness is impaired. To meet the need of recharging these magnets, Randall & Noll, 317-321 South 11th street, Lincoln, Neb., has placed on

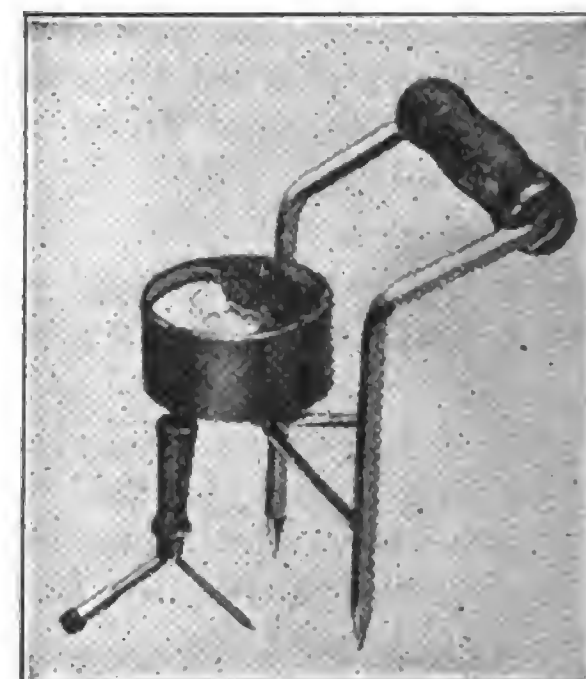


the market the R. & N. magnet recharger, a small electrical unit that should be included in the shop equipment of every truck service station and fleet station.

The R. & N. outfit includes magnet charger and magnet meter, the latter being designed to test the magnets before and after charging.

HYRATE BATTERY ANALYZER.

Truck owners find it to their advantage to make use of short cuts and time-saving methods in truck work and any item that will save time is usually of interest. The Hyrate Battery Analyzer, manufactured by the Service Station Supply Co., 30-32 Larned street, Detroit, Mich., is designed to analyze the condition of a battery in the shortest possible time and to determine its actual condition before tearing it down for repairs.



Advantage is taken of the cadmium and voltage tests, through short-circuiting the battery for a short length of time, and three results are obtained by this method: High-rate discharge test, plain voltage test and cadmium test.

A wide range of service testing is provided for in the instrument and it will prove of value to battery service stations, fleet owners and others in trucking.

PROBLEM OF PROPER TIRE EQUIPMENT

Truck users are coming to realize that tires have a very important part in successful truck operation, and that they are a separate problem from the truck itself.

It has been hard to get sound advice regarding tires, as it has not always been easy for a tire manufacturer to advise the use of some kind of equipment which he did not himself manufacture. Take, for instance, the subject of pneumatic truck tires. The advice regarding the use of these tires has been both confusing and incorrect in many cases. Many a truck owner has learned by expensive experience that the pneumatic has a clearly prescribed field, and that the use of pneumatics outside this field means the waste of money.

As much money is wasted today on wrong tires as on poor ones. Some truck owners wonder why their tire bills are so high while others are moderate. The answer is to be found in many cases in the fact that the wrong type or the wrong size of tires has been selected.

No truck owner needs to be told that the problem is a real one. The uses to which trucks are put are so varied and the types and sizes of tires are so numerous that it is a very easy matter to select the wrong tire for some particular kind of haulage.

Technical Service Department Established.

In the interest of greater economy, the United States Tire Co. has established a Technical Service department, made up of tire engineers, which will give impartial disinterested advice to anybody engaged in truck operation. A full statement of any tire problem from any truck operator in the world will bring a detailed reply from the department giving the latest scientific information on the points involved. Making a complete line of tires, the company need favor no type above another. As the largest rubber company in the world it has a large staff of chemical and engineering experts, which is made available to the truck operator through the Technical Service department.

MACQUEEN JOINS BEARINGS SERVICE CO.

The appointment of K. H. MacQueen as assistant to the general manager of the Bearings Service Co. has been announced from the general office of this company at Detroit, Mich.

Mr. MacQueen was associated with the Bearings Service Co. at the time it was formed, his position being for several years that of purchasing agent. During the war he entered government service, and later became associated with the firm of Bushnell, MacQueen, Bushnell, advertising agents, in Detroit. He returns to the Bearings Service Co. to assist in the active management of the general offices of the company. His office will be in Detroit.



"SOMETIMES I wonder what these birds who write the advertisements call a real good job," grunted O. M. Vett, disgustedly, throwing away the daily paper he had been perusing. "Looks like they think, because they get a sheet of imitation parchment with a dried prune stuck on to it handed to them, they got a right to get away with most anything in the writing line.

"What's wrong with the one in question?" I asked, as I bent to pick up the offending paper. "Which advertisement was it?"

For reply, Vett pointed a stubby finger at a full page ad which told at length of the merits of a certain piece of merchandise. "Very fine ad I should call it," I said, more to draw him out than because I really thought so. "What is there about it that arouses your wrath?" I asked.

"Too many words in it," grunted Vett, savagely pulling away at his unravelled cigar. "Uses up half of a small dictionary to say what could be told in two paragraphs."

"Perhaps it is a bit verbose," I admitted. "No one would particularly object to that would they?"

"They certainly would," said Vett emphatically. "At least I would and I'm somebody."

"Why do you object to it?" I wanted to know.

"Because I didn't have any too much education when I was a boy and I don't care to puzzle out long advertisements. That's why," answered the old man. "Some of you writing fellers lose sight of the fact that there are about 57 million of us who never had much schooling. We want our reading to be made as plain and short as possible. You ought to pay attention to that fact, too," he said sharply, "since we're the ones who do the buying."

"Well-I," I admitted somewhat reluctantly, "perhaps this particular advertisement is rather too long."

"It certainly is," answered the old man. "When you stop to think that some historians tell about the battle of Waterloo in a couple of paragraphs. Yes, sir," he continued, "it's too long, all right. And it's also out of whack in still another dimension," he grinned.

"What do you mean?" I queried, suspecting a joke.

"Well, I'll tell you," laughed Vett. "It's not only too long—it's also too thick—and that's another point that ought to be considered by you writing fellers."

HARVEY, ILL., Sept. 10.—The Harvey Motor Truck Co. has cut the prices on its 3½-ton truck to \$3950 and on its five-ton truck to \$4500.

NEW SHEATH WIRE HEATING UNITS

A new form of sheath wire for electric heating applications has been perfected by the General Electric Co., pioneer in the field of sheath wire development. The new unit is known as the Helical Coil Sheath Wire Unit, being a decided improvement over the drawn sheath wire unit which the company has manufactured for several years, as it is stronger and lends itself to a wider range of industrial heating appliances.

The unit consists of a heating element in the form of a helical coil of calorte wire held firmly in place in a metal tube by a filler of powdered insulating material, giving a compact unit of great mechanical strength. The units have been standardized in diameters of .333, .4 and .496 of an inch, the lengths being up to six feet for the smallest diameter, and up to eight feet for the largest.

The sheath is made of different metals, or alloys, depending upon the use to which the unit is to be put. For immersion in water the sheath is made of copper, tin dipped. For immersion in oil and when the unit is to be cast in a hot plate, a steel sheath is used. When the unit is to be run in the open air, or clamped on the sides of a melting pot, etc., a nickel silver sheath is employed except where the temperatures required are greater than nickel will stand, in which case a calorized steel sheath is provided.

Three special forms of heating units incorporating the helical core sheath wire have been developed. The first is known as an air-heating unit, and consists of a length of sheath wire, equipped with radiating vanes. The vanes are provided with screw holes, permitting mounting of the unit on porcelain knobs, the terminals for the power supply being at each end of the tube. This unit is easily employed for such purposes as heating small drying compartments, storage rooms, exposed valve houses, crane cages, etc., and on process machines where a small amount of heat is required.

The second variety is known as the clamp-on unit, in which the sheath wire is clamped in a steel channel by a strip welded to the latter, the flat surface of the channel serving as a heating surface. Screw holes for mounting are provided along either edge of the channel, and the terminal ends of the sheath wire are bent back to give clearance for the electrical connections. This heater is particularly adapted to warming tables, glue troughs, or other tanks with flat sides, flat plates on process machines, and similar places where a small amount of heat is wanted.

The third type is the immersion heater, of which there are several forms. Those used for heating water have timed dipped copper sheaths, which are bent so that the terminals come out through a common threaded head, provided with a japanned cap for protecting terminals. The oil-heating unit consists of two steel units with four terminals protected by a cap, and has a lower heat density than the others.

Future Possibilities of Automotive Industry

NOTED EXPERT SAYS INCREASES IN DOMESTIC MARKET MUST BE IN SALES OF LOW-PRICED MACHINES—HIGH-GRADE VEHICLES CAN ONLY BE SOLD THROUGH REPLACEMENT—DOES NOT THINK COUNTRY CAN UTILIZE PRESENT FACTORY CAPACITY

“UNLESS exports of cars increase enormously, it appears that the present productive capacity of the industry would be sufficient nearly to double the number of cars in use within the next few years.”

This is one of the interesting deductions made by Leonard P. Ayres, vice president of the Cleveland Trust Co., Cleveland, O., in a booklet recently published by that company entitled “The Automobile Industry and Its Future.” This is a comprehensive discussion of this subject which should be of interest to every automotive manufacturer and dealer in the country, and is a truly valuable and somewhat remarkable contribution to the statistical history of the industry.

Several of the interesting tables with which Mr. Ayres illuminates his discourse are reproduced herewith, and furnish in themselves a copious supply of “food for thought” to the contemplative mind.

The first table shown gives the registration by thousands of motor cars in each state and in the geographic divisions each year from 1912 to 1920. This tabulation is the result of a careful attempt to construct a complete record of registration for each state since 1912. Where figures have been missing in the original records they have been supplied by using data based on those of neighboring states. Similar methods have been used where the data were based on three-year registrations, or perennial systems. The figures are given in round thousands because it is believed that greater detail would not increase their reliability. As the table stands it is believed to represent, somewhat more accurately than have previous compilations, the number of motor cars that would have been registered in each state each year if the system of registration had been complete and uniform since 1912. The data include both passenger and commercial cars, but not motorcycles, tractors or dealers' cars.

Data of Production.

The year 1895 may be taken somewhat arbitrarily as marking the beginning of the automobile industry on a commercial basis in America. It seems probable that the first electric vehicle for street use was sold by William Morrison of Des Moines, Ia., in 1892. The first sale of a gasoline-propelled car is stated to have been made by Alexander Winton of Cleveland, O., in 1898. During 1896, 1897 and 1898 at least 10 of the important pioneer companies began the sale of electric cars, while several makers of gasoline and steam cars began production in 1889 according to available data.

The first official data on car output are those of the census of manufacturers of 1899. By that date so great progress had been made that the census recorded 57 establishments, employing 2241 wage

earners, as making automobiles. Their output during the year was 3700 vehicles and, in addition, 174 more were made in factories primarily devoted to the manufacture of carriages and wagons. This

MOTOR CARS REGISTERED IN EACH STATE AND IN THE GEOGRAPHIC DIVISIONS EACH YEAR FROM 1912 TO 1920—FIGURES REPRESENT THOUSANDS.

	1912	1913	1914	1915	1916	1917	1918	1919	1920
Maine	8	11	16	22	31	41	40	53	63
New Hampshire.....	6	7	10	13	18	22	25	32	35
Vermont	4	6	8	11	16	20	22	27	32
Massachusetts	50	63	77	103	137	174	193	247	305
Rhode Island	9	10	12	16	21	37	36	45	50
Connecticut	24	27	33	44	62	86	93	110	119
New England.....	101	124	156	209	285	380	409	514	604
New York.....	107	134	170	234	313	412	464	572	669
New Jersey	43	49	60	78	104	135	156	191	228
Pennsylvania	59	76	113	160	231	325	394	482	570
Middle Atlantic.....	209	259	343	472	653	872	1,014	1,245	1,467
Ohio	63	86	123	181	252	347	413	511	615
Indiana	34	47	66	97	139	192	227	277	333
Illinois	68	95	131	181	248	340	390	478	563
Michigan	40	54	76	115	160	247	262	326	413
Wisconsin	25	35	53	80	116	166	197	237	293
East No. Central.....	230	317	440	654	915	1,292	1,489	1,820	2,223
Minnesota	29	38	66	93	138	163	165	195	224
Iowa	47	75	112	152	199	254	278	364	437
Missouri	24	38	54	76	104	148	188	244	297
North Dakota	9	13	16	25	40	63	72	83	91
South Dakota	14	15	21	29	44	67	91	105	129
Nebraska	16	26	41	59	101	148	175	192	223
Kansas	22	34	49	73	112	159	189	228	265
West No. Central.....	161	239	361	507	738	1,002	1,158	1,411	1,657
Delaware	2	2	3	5	7	11	13	16	18
Maryland	10	14	20	31	44	61	75	96	112
District of Columbia.....	2	2	5	8	13	15	30	35	40
Virginia	6	9	14	21	35	55	72	94	134
West Virginia	5	5	6	13	21	31	39	50	79
North Carolina	6	10	15	21	34	56	72	109	141
South Carolina	10	12	15	15	19	40	55	70	93
Georgia	19	19	21	26	48	70	100	127	144
Florida	2	2	3	11	21	27	54	55	74
So. Atlantic.....	62	75	102	151	242	366	510	652	833
Kentucky	5	7	12	20	32	47	66	91	113
Tennessee	9	12	20	25	30	48	63	80	102
Alabama	3	5	8	12	22	33	46	59	75
Mississippi	3	3	6	10	25	37	48	55	63
East So. Central.....	20	27	46	67	109	165	223	285	353
Arkansas	2	3	6	8	15	29	41	49	59
Louisiana	7	7	12	11	17	28	40	51	66
Oklahoma	7	8	14	25	53	100	122	145	204
Texas	35	54	65	138	196	213	251	331	428
West So. Central.....	51	72	97	182	283	370	454	576	757
Montana	2	6	10	14	24	43	51	59	61
Idaho	2	2	3	7	13	25	32	42	51
Wyoming	1	2	2	4	7	13	16	21	24
Colorado	9	13	18	28	43	67	84	105	123
New Mexico	1	2	3	5	8	8	15	18	22
Arizona	2	3	5	7	12	20	24	29	35
Utah	3	4	7	9	14	24	32	35	43
Nevada	1	1	1	2	5	7	8	9	10
Mountain.....	21	33	49	76	126	207	262	318	375
Washington	14	24	30	39	61	91	117	149	174
Oregon	10	14	16	24	34	49	63	83	104
California	65	103	124	164	232	307	365	477	569
Pacific	89	141	170	227	327	447	545	709	847
United States	944	1,287	1,773	2,545	3,078	5,101	6,064	7,539	9,118

output of 3874 cars in 1899 undoubtedly consisted mostly of electric vehicles.

Fundamental Facts of Production.

The second table, shown herewith, attempts to give the essential fundamental data of the production and use of automobiles since the beginning of the industry in this country. Its production figures were taken from the reports of the census each five years, beginning with 1899, supplemented by data for the intervening years compiled by the National Automobile Chamber of Commerce. In addition, the War Industries board reported official figures for the years 1917 and 1918. The figures prior to 1899, and from that date on to the next official data in 1904, are estimates.

This table gives in its second column, the computed number of old cars carried over each year from the year previous. It gives, in the next two columns, the number of Ford cars and of other cars built each year. This distinction is made because it is of fundamental importance in a consideration of the past history and probable future of the industry. The fourth and fifth columns give the number of cars imported and exported each year. These data are taken mainly from the reports of the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce and from the earlier summaries of commerce and finance that preceded them. The very earliest figures of the columns are partly estimated. The exports for 1918 have been increased to include the cars shipped abroad by the army.

since the inception of the industry 25 years ago. Up to the end of 1920 the total number of cars made in the United States since the beginning has been 11,775,163, according to these figures. Of this number 4,671,202 were Fords. The aggregate imports have been 13,296 and the exports 712,646.

After making allowance for imports and exports it is found that the total number of new cars put into use in this country since the beginning has been 11,075,813. Since the number registered last year was somewhat in excess of 9,000,000, and the number in use at the end of the year undoubtedly rather less than that amount, it follows that about 2,000,000 cars have been eliminated, and the report purposes to find how these eliminations have been distributed.

Computation of Registration.

The third column from the last gives the number of cars registered each year. These are figures of record beginning with 1912. Previous to that date they are computed by calling the registration of any one year equal to the number of cars put into use in that year and five previous years. This method, applied to the last nine years of the series for which we have actual data of record, gives closely accurate results and so its use for the earlier years seems justifiable. It gives figures showing how many cars would have been registered each year if the system of annual registration had been continuously in use, and they may be accepted as fairly reliable estimates.

production after corrections were made for exports and imports. Beginning in 1911 the data for elimination are based on the recorded figures for production and registration. In general the figures for cars discarded show a tendency to be high in years of prosperity and low in years of business depression.

Average Length of Service.

The most dependable method of computing the average life or duration of service of automobiles seems to be that which compares the registration of any year with the figures for the production of that and previous years. The outstanding fact about the registration figures is that they have been for the past nine years about equal each year to the sum of the cars produced in that year and the five previous years. This means that the average length of life of the cars has been about six registrations. This is substantiated by the report of the postmaster-general for 1916 that the depreciation of cars in the postal service has been at the average rate of 22.9 per cent. per year. The annual reports of the Interstate Commerce commission show substantially the same depreciation. These cars, of course, receive exceptionally hard usage. It is somewhat surprising to note, however, that the average length of service of cars appears to have stayed nearly constant toward the end of the period covered instead of growing longer as cars and roads have been improved. It seems not improbable that this is due not to any decline in the quality of the cars, but from the fact that in recent years the great increase in the output and registration of automobiles has been largely caused by the enormous production of light and inexpensive cars and that a major part of them have gone into farming communities where they have been subjected to the hardest sort of use over the worst kinds of roads.

Data in Regard to Prices.

The accompanying table of prices shows the figures, year by year, of 25 standard makes of touring cars from 1913 to the present time. Of these cars five are four-cylinder machines which are widely used, while the other 20 are well-known six-cylinder machines. The attempt has been made in each case to get the typical price for each year on the same model over the entire period as nearly as this is possible in view of the great improvements that have been made.

The figures at the bottom of the table show the average and median prices of the 25 cars over these eight years. The median is a kind of average that is found by taking each year the middle price among the 25 prices in the column. The median price is such a price each year that there are 12 among the 25 cars that are cheaper, and 12 that are more expensive.

The course of the average and median figures show that the typical prices of cars fell from 1913 to 1916 and rose from that point to the beginning of 1921, when they again began to decline.

During the period of increasing competition from 1913 to 1916 the prices of medium-grade cars fell most severely, and during the long period of expanding

PRODUCTION AND USE OF AUTOMOBILES IN THE UNITED STATES SINCE THE BEGINNING OF THE INDUSTRY.

Year	Cars carried over from last year	Ford cars made	Other cars made	Cars imported	Cars exported	Total new cars added during year	Cars registered during year	Cars eliminated during year	Cars in use at end of the year
1895..	.....	.....	300	....	.....	300	300	.....	300
1896..	300	.....	600	....	.....	600	900	.....	900
1897..	900	.....	1,200	....	.....	1,200	2,100	.....	2,100
1898..	2,100	.....	2,400	100	.....	2,500	4,600	.....	4,600
1899..	4,600	.....	3,874	150	.....	4,024	8,624	.....	8,624
1900..	8,624	.....	5,000	200	.....	5,200	13,824	300	13,524
1901..	13,524	.....	7,000	250	184	7,066	20,590	600	19,990
1902..	19,990	.....	9,000	300	535	8,765	28,755	1,200	27,555
1903..	27,555	708	10,292	350	822	10,528	38,083	2,500	35,583
1904..	35,583	1,000	21,830	400	949	22,281	57,864	4,024	53,840
1905..	53,840	1,695	23,305	496	1,348	24,148	77,988	5,200	72,788
1906..	72,788	1,599	32,401	1,295	1,155	34,140	106,928	7,066	99,862
1907..	99,862	8,423	35,577	1,093	2,894	42,199	142,061	8,765	133,296
1908..	133,296	6,398	58,602	1,347	2,164	64,183	197,479	10,528	186,951
1909..	186,951	10,607	116,680	1,645	4,686	124,246	311,197	22,281	288,916
1910..	288,916	18,664	168,336	1,024	8,443	179,581	468,497	24,148	444,349
1911..	444,349	34,528	175,472	972	15,807	195,165	639,514	50,662	588,852
1912..	588,852	78,440	299,560	868	23,720	355,148	944,000	115,603	828,397
1913..	828,397	168,220	316,780	492	26,889	458,603	1,287,000	61,570	1,225,430
1914..	1,225,430	248,307	324,732	296	25,765	547,570	1,773,000	56,881	1,716,119
1915..	1,716,119	308,213	584,405	221	63,958	628,881	2,545,000	371,196	2,173,804
1916..	2,173,804	523,929	1,059,688	1,429	80,850	1,504,196	3,678,000	365,790	3,312,210
1917..	3,312,210	735,256	1,133,691	78	80,235	1,788,790	5,101,000	81,218	5,019,781
1918..	5,019,781	706,584	447,053	73	109,491	1,044,219	6,064,000	319,009	5,744,991
1919..	5,744,991	790,954	1,085,402	117	82,464	1,794,009	7,539,000	446,010	7,092,990
1920..	7,092,990	1,027,677	1,177,520	100	180,287	2,025,010	9,118,000	.....	.....

New Cars Added Each Year.

The sixth column gives the total number of new cars added each year. These figures are the result of adding the new Fords and the other cars manufactured and the cars imported, and then subtracting from this total the cars exported. The results probably give with fairly close accuracy the total number of cars that have been put to use in this country

Data of Elimination.

In the next to the last column are figures showing the number of cars eliminated each year. It will be noted that the numbers previous to 1911 are in each case equal to the figures for new cars added five years earlier. This is because the registration figures for this early period are not data of record, but are computed as being equal to six years of

PRICES OF STANDARD TOURING CARS FOR NINE YEARS.

	1913	1914	1915	1916	1917	1918	1919	1920	Jan. 1921	July 1921
Auburn			1,050	1,085	1,295	1,595	1,595	1,695	1,895	1,690
Buick	1,285	1,335	1,235	1,020	1,070	1,265	1,595	1,495	1,795	1,525
Chalmers	1,950	1,775	1,650	1,090	1,250	1,565	1,565	1,685	1,795	1,545
Chandler	1,785	1,595	1,595	1,295	1,395	1,595	1,795	1,895	1,895	1,785
Chevrolet ...	875	875	490	490	635	865	865	735	820	645
Dodge		785	785	785	785	885	1,085	1,085	1,285	985
Ford	550	490	440	360	360	525	525	525	440	415
Franklin	2,900	2,300	2,150	1,950	1,950	2,250	2,650	2,850	2,700	2,650
Haynes	2,700	2,785	1,550	1,495	1,725	2,150	2,485	2,685	2,935	1,985
Hudson	2,250	2,350	2,350	1,650	1,650	1,975	2,100	2,200	2,400	2,250
Kisselkar ...	2,500	2,350	1,650	1,485	1,295	1,385	1,645	2,975	3,475	3,475
Locomobile ..	5,100	5,100	5,100	5,400	5,000	6,600	7,550	8,100	7,550	8,600
Marmon	5,000	5,000	5,000	2,950	3,100	3,550	3,950	4,650	5,000	3,985
Maxwell	750	695	695	595	745	895	995	985	995	845
McFarlan ...	2,590	2,590	2,990	3,500	3,550	4,300	4,300	4,800	6,300	6,300
Mitchell			1,250	1,325	1,425	1,510	1,475	1,750	1,750	1,490
Moon	2,150	2,250	2,250	1,295	1,095	1,685	1,855	1,985	1,985	1,985
National	2,375	2,375	2,500	1,750	1,995	2,450	2,450	3,290	3,750	2,990
Oakland	1,075	1,785	1,200	875	990	1,185	1,075	1,165	1,395	1,145
Overland	985	950	1,075	750	795	1,095	985	985	895	695
Pierce-Arrow	5,000	5,000	5,000	5,000	5,500	5,500	6,500	7,750	7,500	7,500
Premier	2,785	2,700	2,300	1,685	2,285	2,585	2,585	4,300	4,600	3,890
Stutz	2,050	2,150	2,275	2,550	2,550	2,750	2,850	3,350	4,000	3,350
Velle	2,000	2,350	2,015	1,065	1,185	1,340	1,465	1,885	1,885	1,585
Winton	3,250	3,500	3,500	2,335	2,735	3,000	3,200	4,250	4,600	4,600
Total	51,905	53,085	52,095	43,753	46,360	54,500	59,170	69,070	73,640	67,915
Average	2,359	2,308	2,084	1,750	1,854	2,180	2,367	2,763	2,946	2,717
Median....	2,200	2,200	1,600	1,200	1,300	1,500	1,700	1,900	1,900	1,900

demand from 1916 to 1921 they rose steadily. At the peak of prices in the beginning of 1921 the typical medium-priced car was selling for about 49 per cent. more than in 1916.

The price changes among the low-priced cars have been more rapid, but of smaller proportions. Their price advances from the low figures of 1916 came suddenly and were well maintained during the years of high commodity prices. Their reductions since the beginning of 1921 have been proportionately greater than those of the other cars.

The most expensive cars have advanced their prices with little interruption since 1913 until, in 1921, their general level of cost had risen to more than 60 per cent. above the 1913 figures. Their reductions, since the beginning of 1921, have been moderate.

The figures indicated on the table show that motor car prices have swung through a considerable range as costs and demand have changed with varying degrees of general prosperity and depression. The present indications suggest that even greater proportional changes may be expected in the future, as the industry, with its great productive capacity, competes for the sale of its output in markets where declining prices have sharply reduced the public's purchasing ability.

Number of People Per Car.

Mr. Ayers also brings forward special tables to show the number of persons in the entire population for each car in use each year, the percentage of the entire population in 1910 in age and nativity groups, cars in use each year for each 100 native white men of voting age, and people per car and adult native-born white men per five cars in use in 1920 by divisions.

So short a time ago as 1912 there were 114 people for each car in use, while eight years later there was one car for each 12 people. There is a great difference in the figures for the various divisions of the country, there being a car for every seven people in the states of the Pacific Coast division, while in the East South Central states there is one car for

every 27. There are states, such as South Dakota, Iowa, Nebraska, Kansas and California, so well supplied with automobiles that the entire population could probably go riding simultaneously. Such a statement as this inevitably will bring to mind the question of the limits to the ability of the country to purchase and use cars. On the other hand, it may be argued that, with only about 8,500,000 motor vehicles in use in a country of more than 105,000,000 people, great possible markets still exist.

Probable Purchasing Power of Various Groups.

Studying the composition of this population with reference to its probable purchasing power for automobiles, it may be noted that great deductions must be made from the total population of the country as soon as it is attempted to estimate the possible purchasers of automobiles.

The complete census data for 1920 are not yet available, but the census of 1910 gives a fairly reliable basis for discovering the proportions of the whole population found in certain great groups. To begin with, some 44 out of each 100 are less than 21 years of age, while four in each 100 are over 65 years old. This leaves 52 per cent. of the people from among whom the purchasers must clearly come. Of this 52 there are 17 who are immigrants and colored people. While there are in the aggregate many motor owners in these groups, it seems entirely probable that no very large number among them who do not already own cars will be able to purchase them during the next few years.

The remaining possible purchasers are the 35 per cent. consisting of native-born white men and women between the ages of 21 and 65. About half of these are women who in the main are the wives of the men. It seems to be a fair conclusion that the purchasers of automobiles will in their very great majority come from the 18 per cent. of the population who are native-born white men between the ages of 21 and 65. Since the population consists of some 105,000,000 people, this group comprises about 19,000,000.

Probably about half of them already own cars. This would seem to be safe conclusion, even after allowance has been made for the ownership of more than one car by one individual and the ownership of trucks and passenger cars by corporations.

Number of Wage Earners.

Another factor that enters into this estimate of probable purchasers of motor cars is the number of persons in gainful occupations. This class was recorded in 1910 as being over 38,000,000, of whom about 30,000,000 were men and boys. This number includes many young people for the entire male population above the age of 10 was 37,000,000. While many changes have taken place since 1910 in the distribution of people in occupations, it is probable that the changes in the proportions in each sort of work have not been so revolutionary as to make a study of the earlier figures misleading. Accordingly Mr. Ayres has gone through the data of the occupational census of 1910 and taken out of the lists of the gainfully employed all those engaged in such sorts of work as to make it improbable that they would be included among the purchasers of automobiles. Those subtracted from the number of men gainfully employed included common laborers, semi-skilled workers, apprentices and boys, clerks, stenographers, fishermen, lumbermen, soldiers, sailors, domestic and personal workers, life savers and lighthouse keepers.

These subtractions reduce the number of men wage earners in 1910 from 30,091,564 to only 16,865,546, and if this number is increased in proportion to the population, so as to make it applicable to the census figures for 1920, it becomes 19,384,584. Similar reductions among women workers bring their number down to a comparatively low point, but the changes in the occupations of women have been so considerable since 1910 that it seems best to omit them from the present calculations.

Three Sets of Evidence.

Three bodies of evidence have been reviewed which tend to indicate that the class of people in this country, among which many purchasers of automobiles may be found, numbers about 20,000,000. This is approximately the number of native-born white men. It is also about the number of white families. It also closely approximates the number of persons earning money who are in occupations sufficiently remunerative and of such a nature that they are not disbarred from becoming purchasers of automobiles. All three bodies of evidence are in substantial agreement.

The Saturation Point.

Mr. Ayres believes that the available evidence is inadequate to permit making at this time a valuable estimate of the probable saturation point of the automobile industry. It seems clear to him that nearly every family would like to own a passenger car, that many individuals would like to own cars in addition to the family machines and that there are few commercial and industrial establishments that would not possess commercial cars or trucks if they could.

It seems equally clear that no such

universal use of automobiles is possible at present or in the near future because a large proportion of the people cannot afford to purchase or run them. The only competent estimates of the distribution of incomes in the United States are stated to be those for 1910, compiled by Willard I. King in his volume entitled, "The Wealth and Income of the People of the United States." While those figures are now seriously out of date and do not represent present conditions, they are interesting to consider. Professor King's researches show that at that time, out of every 1000 families 694 (more than two-thirds) were receiving annual incomes of less than \$1000 and that some 95 per cent. of all received less than \$2000 a year. Estimates for 1920 will show marked increases over these figures, but the general lesson derived from the 1910 census will remain unchanged. The new figures, like the old ones, will show that many more than half of all the income receivers get less than \$1000 a year and this is true even after careful allowance has been made for the value of the produce of farmers that is consumed by themselves and their families without being sold.

The Value of These Figures.

The value of these figures in estimating the possibility of increased markets for automobiles is great. They indicate that increases in the domestic markets must be largely among the users of low-priced machines. Practically all wealthy families and a large proportion of those in moderate circumstances now own machines. The same generalization can be made with regard to nearly all prosperous business and industrial establishments and a large part of those that are no more than fairly successful. These individuals and firms of more than average money resources constitute the market for the more expensive vehicles. In the main this market has already been supplied and its future requirements will be largely for replacements and for gradual extension as economic well-being becomes more generally diffused.

Replacements.

The available figures indicate that about 8,500,000 automobiles were in use in 1920, and it seems certain that the number used in 1921 will be well in excess of 9,000,000. If the average length of service of the machines continues to be about six seasons, and if the number in use should not increase or diminish, this would require an annual replacement of no fewer than 1,500,000 machines a year. Up to the present time no such replacement figures have been even approached, but they are certain to come unless the use of automobiles markedly decreases. Most of the machines now in use are comparatively new. They are the output of the past five years, during which the annual production has been from 1,500,000 to more than 2,000,000, except for the war year of 1918. Previous to 1916 the output each year was much smaller. At the present time about half the machines in use are less than three years old.

It is sometimes suggested that the number of cars in use may actually decrease now that the abnormal wages of the war period are past. To Mr. Ayres,

however, it seems improbable that anything short of a prolonged era of serious business depression can force many people who now have cars to give them up.

Productive Capacity.

The productive capacity of the automobile industry in this country has been stated to have been 2,660,000 cars a year at the close of 1920. This figure is probably fairly accurate, for the cars produced in 1920 were about 2,200,000, with curtailed operations prevailing in the last three or four months. As new plants have since been completed, the country's present annual capacity is somewhat greater and may perhaps be in the neighborhood of 2,750,000. It almost surely lies somewhere between 2,500,000 and 2,750,000.

If all these plants should produce cars at their full capacity and if the cars

as it is now to utilize our present car manufacturing capacity. This seems to Mr. Ayres most unlikely in the near future.

Another consideration of no small importance is that if the number of automobiles should be doubled in the near future, some other motor power than gasoline would probably have to be developed to propel them.

It appears, then, that the country will shortly need about 1,500,000 cars annually if the use of automobiles remains at about its present status. Its productive capacity is more than 1,000,000 a year in excess of this.

There seems to be only two ways, according to Mr. Ayres, in which this capacity can be fully utilized. The first is through a continuing great increase in the use of cars until they are about twice as numerous as at present. The second is through building up an enormous export trade. In view of present economic conditions and future prospects here and abroad, both solutions seem to Mr. Ayres as highly improbable of realization.

FORD'S OFFER LOW, ASSERTS PINCHOT.

WASHINGTON, D. C., Sept. 10.—Henry Ford's terms for taking over the Muscle Shoals power and nitrate plant were assailed publicly by Gifford Pinchot, former chief forester and conservationist. Mr. Ford's offer, Pinchot declares, was equivalent to interest at only 3 6/10 per cent. on the investment; that it proposed no payment for water power, that certain machinery in the plant was worth more than the Ford offer for the whole and that it took too little account of the production of fertilizer.

Mr. Pinchot said he did not believe Mr. Ford's offer should be rejected, but that it should be revised to provide a return of the property to the government in 50 years if wanted, that Mr. Ford "pay for the property of the people something approaching what the property is worth," and to "make clear what it offers to farmers beyond doubt."

BETTER ROADS FOR THE PHILIPPINES.

The 30 provincial road projects which are part of the good roads programme inaugurated by the Philippine government for 1921 will double the length of the first class roads in the islands and bring the total to more than 8000 kilometers distributed in provincial and interprovincial systems. Many new provincial automobile and truck lines are being established throughout the islands. Some of the companies are well capitalized and operate in various sections through a general corporation with reasonable freight and passenger traffic.

LINCOLN JOINS TRACTOR TRAIN CO.

Neil S. Lincoln, formerly in the purchasing department of the Chalmers Motor Co., and later associated with George W. Dunham in New York City, was recently made general manager of the Tractor Train Co., Connersville, Ind.

DON'T.

DON'T take your engine to pieces just to see what makes it go.

DON'T race your engine when stopping in a traffic jam.

DON'T advance your spark so far that the engine starts to knock.

DON'T buy "cheap" tires. They are never low-priced, but expensive.

DON'T adjust non-skid chains so tight that they cut tires.

DON'T neglect small cuts in the tire. Fill them with cement.

DON'T tear around corners and expect to have a smooth-running car.

DON'T engage your clutch too sharply nor apply brakes too harshly.

DON'T forget these few DON'TS.

should last on the average long enough to be registered during six seasons, the annual registration would soon be from 15,000,000 to 16,500,000. It has already been pointed out that registration figures are in excess of the number of cars actually in use at any one time, and the difference between the two numbers is equal to the annual elimination. This means that if the present productive capacity should be utilized to the full over a period of some years, and all the cars were used in this country, there would have to be from 12,500,000 to 13,750,000 actually operated to consume the annual output. If improved construction, more intelligent use, and better roads should increase the actual term of service of the cars to eight years instead of six, the number in use would have to be about 17,000,000 or 18,000,000 to take care of the production. This would mean that the number of cars in use would have to be twice as great

Eisemann High-Tension Magneto Solves Ignition Problem

THIS TYPE MAGNETO IS USED LARGELY FOR IGNITION ON MOTOR TRUCK AND TRACTOR ENGINES—COMBINATION GENERATOR AND HIGH-TENSION MAGNETO PROVIDES IGNITION AND LIGHTS FOR CARS

THE prime factors that must be considered when specifying ignition equipment for electrically ignited internal combustion engines are: Dependability, economy of upkeep, simplicity and sturdiness of design. In fact your ignition system must be one that will provide an intensely hot, fat spark, under any and all conditions—winter or summer, high or low speed, all day and every day in the year if necessary.

The high-tension magneto when compared to the conventional battery sys-

tem, engine, etc., and as the battery becomes exhausted from these duties, its current output becomes lower and the current supplied for ignition purposes also becomes lower, resulting in slower combustion in the engine combustion chambers, loss of power and the many incidental features in connection with this defect.

The use of a high-tension magneto, which develops a spark of like intensity at all speeds of the engine solves this defect in internal combustion engines in a simple manner by sending the current

The Eisemann high-tension magneto, manufactured by Eisemann Magneto Corporation, with general offices and factory at 33rd street, Brooklyn, N. Y., with branches at 429 Willis avenue, W., Detroit, Mich., and 1469 S. Michigan avenue, Chicago, Ill., which makes a very complete line of high-tension magnetos, combination magneto and generator, special high-tension magnetos and attachments for the Ford and Fordson, and parts and supplies under the heading of accessories for servicing the units which they manufacture.

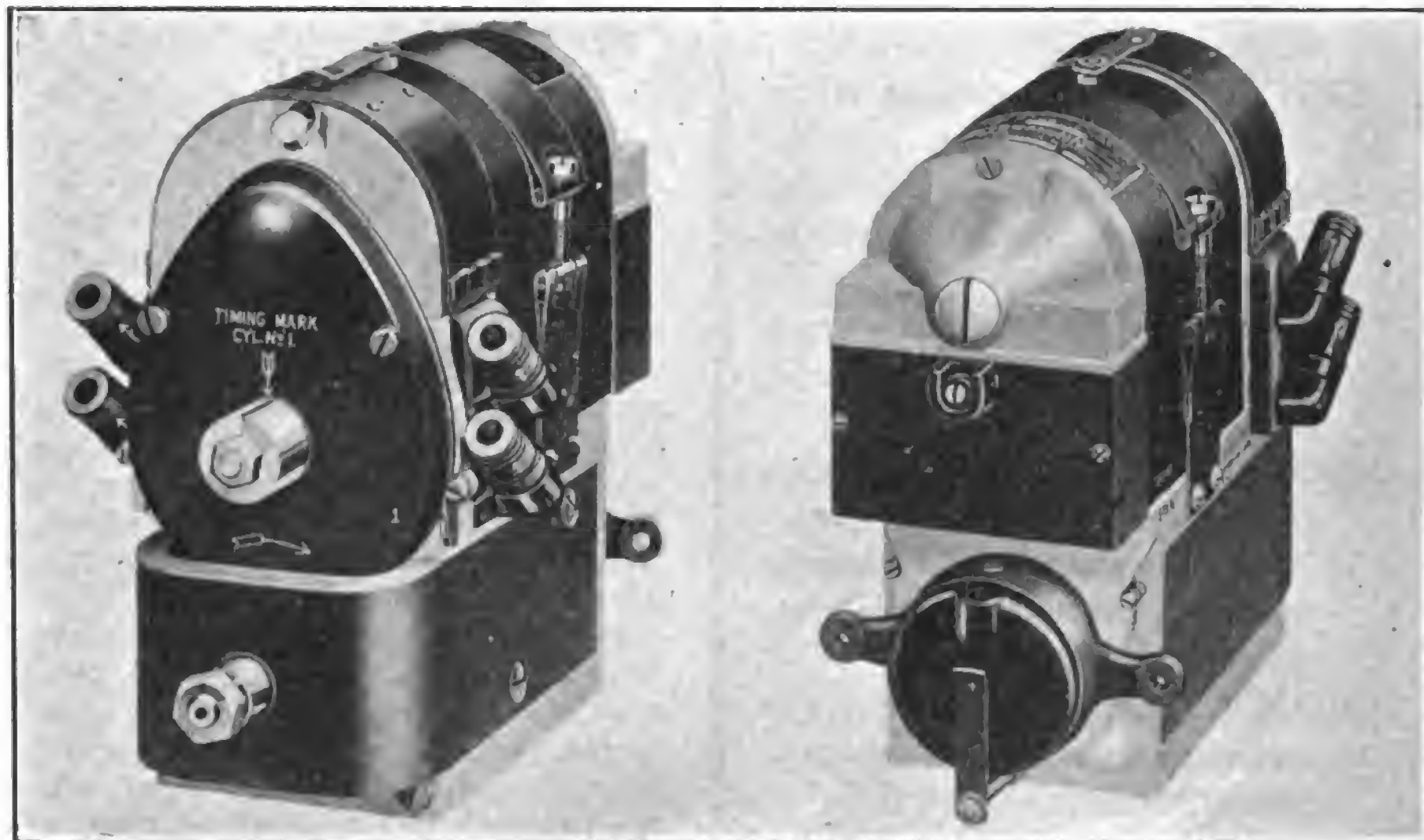
The Eisemann Magneto Corporation was originally a pioneer in the high-tension magneto field. In fact it is said that Ernst Eisemann in 1901 was the first to manufacture and introduce a "jump-spark" magneto. Its wonderful efficiency and proven dependability to keep on the job are natural results of years of experience in design and precise methods of manufacture.

At the present instance Eisemann equipment is in use by 170 manufacturers who use the Eisemann high-tension magneto and its auxiliaries of which 132 are leading concerns in the production of the highest priced motor trucks and tractors in the country.

Besides its remarkable durability and rugged construction the Eisemann magneto is impervious to water. Its working parts, however, are instantly accessible for inspection or cleaning by merely swinging aside two flat springs. Furthermore, it produces an intensely hot spark at low speeds, especially on a hard pull, and will start the engine at as low a speed as the carburetion will permit. The masterful performance of the Eisemann magneto is due mostly to the simplicity and carefulness in design, the extreme care employed in selection of material and in the manufacture, the well proportioned winding, effective condenser and the perfect electrical insulation used throughout.

The Generation of Current.

The magnetic field, which is the region permeated by lines of electrical force, is created by two permanent horseshoe magnets which fit accurately over two pieces of soft iron, called the "pole shoes." These magnets are powerful and permanent. In the magnetic field, between the pole shoes, there rotates an armature which is mounted on ball bearings, and driven by the engine from the timing gearset. This armature has a combined winding—primary and secondary—and, when rotated in the magnetic field, a low-tension current is induced in the primary winding. When at the moment of



Type M4G6 Magneto Generator Set: Left, Driving End and Distributor; Right, Breaker Box Containing Breaker Points, Designed for Motor Vehicles Without Lighting System; Easily Installed in Place of Regular Magneto.

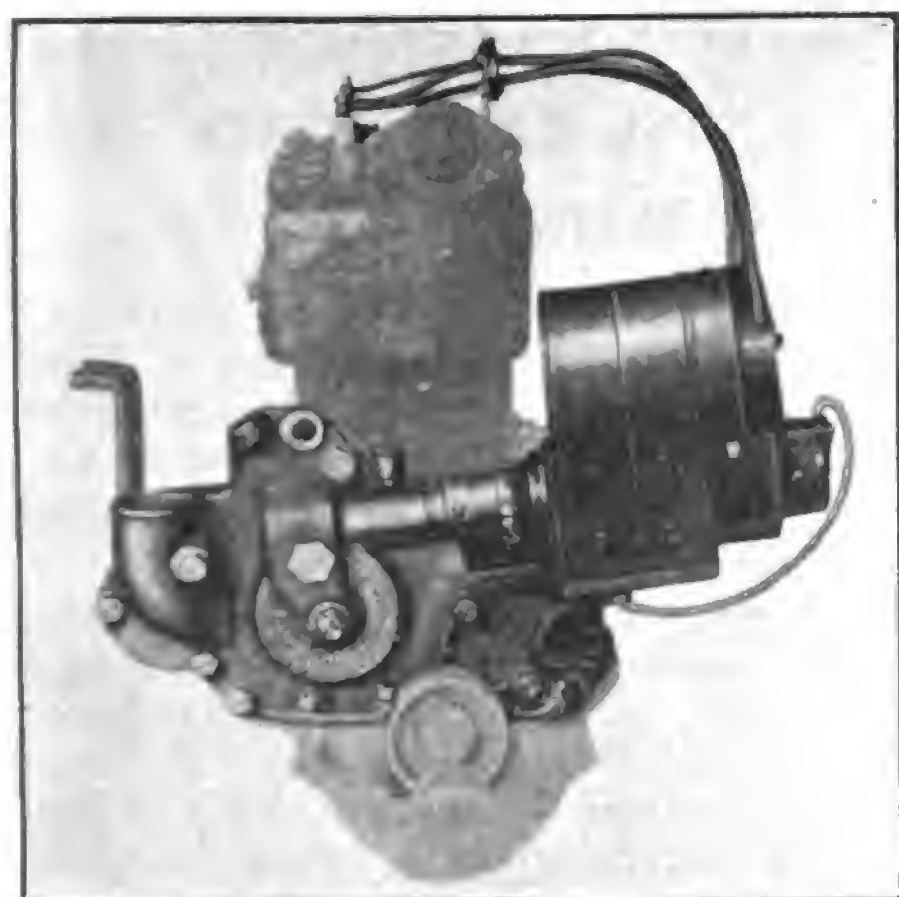
tem, which is used largely by passenger cars and a few motor trucks, offers a simple solution of the ignition problem, as the unit being self-contained requires only one wire besides the spark plug terminal wires to complete the circuit for its operation. This one wire is used only when stopping the engine and short-circuits the current of the magneto to the car frame, cutting off the ignition current and incidentally stopping the engine.

The conventional battery system, on the other hand, depends upon a storage battery for its source of current, the battery in turn being supplied by a generator, which is driven by the engine and charges the battery between certain predetermined engine speeds, usually between 15 and 25 miles per hour at its highest charging rate, tapering off to a lower and lower rate as the speed of the engine increases above 25 miles per hour.

The battery system is called upon for a multitude of duties in the operation of the car, such as operating the lights, sounding the motor driven horn, starting the

through short lead wires to the plugs, where a hot spark is delivered which is capable of thoroughly igniting the gas mixture, causing complete combustion, thus enabling the engine to deliver its full rated horsepower through all speeds at which the carburetor is able to successfully deliver the gas mixture.

The wiring of a battery ignition system is composed of many wires, leading into and out of the various instruments needed for the operation of the car, and as these are subject to derangement, the battery system is called upon to meet these conditions as well as to deliver its current supply to the units which use it. Derangements of the wiring system are many and often require the services of an expert in electric wiring to straighten them out. With the high-tension magneto system this condition is avoided as far as the wiring is concerned, as the wiring is all in sight, easily reached for inspection and the troubles that may occur to the system are of minor importance and easily remedied.



Model E 20 Eisemann Magneto Attachment for Fords Providing High-Tension Ignition in Place of Regular Ford Ignition.

greatest intensity this current is broken by the opening of the contact breaker, a high-tension spark of great heat is developed in the secondary winding. One end of this secondary is connected to a so-called "collector ring," from which the current is led to the distributing mechanism and finally delivered to the spark plugs in proper sequence.

The armature core, which carries the combined winding as previously mentioned, is of the "H" shaped type, or what is possibly better known as the Siemens Shuttle Wound type. It is made up of two end pieces of malleable iron, between which are a number of insulated laminations of soft-iron, riveted together with the end-pieces by a special process, so that the complete core is formed as one solid unit.

On this core are wound a few layers of medium size copper wire, the beginning of which is grounded on the armature core, and the end, through several mediums, makes connection with the contact breaker mechanism. Over this primary winding is a secondary winding consisting of many turns of very fine copper wire, the wire itself being insulated its entire length and the layers carefully insulated from each other. The beginning of the secondary is connected directly to the end of the primary winding and the end is led to the collector ring, which is mounted on one end of the armature.

The greatest skill and care is necessary in the winding of an armature and insulating the windings from one another, and hence only the most skilled workmen are employed. The Eisemann armature, when wound, is then subjected to a special insulating process which adds greatly to its efficiency. Insulation by impregnating consists of first drying and withdrawing all moisture and air by vacuum in tanks especially constructed for the purpose. While still in vacuum, the insulating varnish is drawn into the sink, submerging the armatures, after which the tank is subjected to high air pressure, forcing the varnish through into the winding. It is then baked and two brush coats of varnish applied, each coat being baked for several hours. This treatment produces an armature absolutely impervious to moisture. The excellent workmanship and material, the great care exercised in the winding and insulating pro-

cesses are responsible for the perfection of Eisemann armatures, it is claimed, and it is a noteworthy fact that the short-circuiting or "burning out" of an Eisemann armature is an extremely rare occurrence.

The condenser, which is built in at one end of the armature, prevents a spark from occurring at the contacts at the opening of the contact breaker, which would otherwise pit and burn the platinum contacts, and it also increases the intensity of the spark at the plugs. The very best material obtainable and expert workmanship combined make the Eisemann condenser a unit which has high efficiency.

The Contact Breaker of Unique Design.

This part is so-called because the separation of its contacts "breaks" the primary circuit. It consists essentially of a brass disc fastened in a cone in the end of the armature, and carrying the mechanical and electrical elements on its outward face. Mounted on this face is a stationary insulated contact block, connected with the end of the primary winding by means of a screw which holds the entire breaker, and carries the fixed platinum screw. Operating against this contact is another platinum contact attached to a bell-crank lever, or "rocker arm," swinging on a self-lubricated bearing of exclusive design, and which is actuated by a specially treated fiber block in its outer end riding over two flat steel cams in the timing lever body. The contacts are normally kept closed by a flat steel spring which also serves the function of grounding the rocker-arm and, consequently, the moving platinum contact. Since the breaker mechanism must open and close in a fixed relation to the position of the armature, it is set by a key formed on its conical part, which fits a corresponding key-way in the armature.

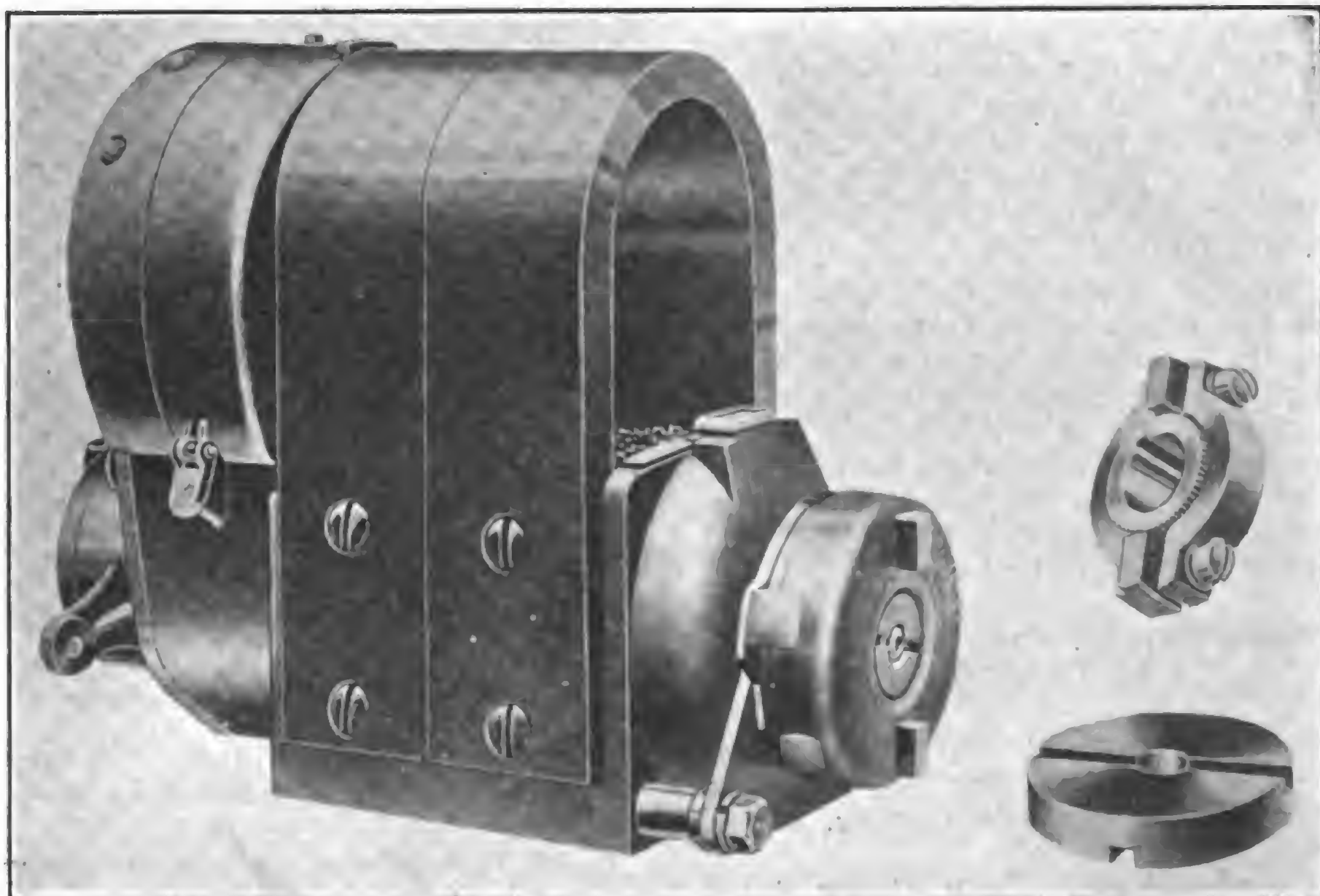
As previously described, the end of the secondary winding is attached to the collector ring, whence the high-tension current is picked up by a brush in the distributor plate and carried to the center brush. This center brush in turn makes

contact with the "T" shaped metal insert of the distributor disc. This disc is attached to the distributor gear and rotates with it, so that the metal insert makes contact in rotation with each of the outside carbons of the distributor plate, from which the current is led to the spark plugs by the high-tension cables.

The proper fastening of the cables to the distributor plate end cap is of great importance in order to avoid short-circuiting due to water. In the Eisemann all connections are entirely inside, where they are completely protected. The high-tension cables are fastened by winding the end of the wire around the carbon brush holder, and pinching it with a large hexagon nut.

The housing used in Eisemann high-tension magneto construction is of a new unit-cast type, whereas the earlier housings were built of several parts assembled. This unit-casting has the advantage that it is extremely rigid, positively eliminating all danger of loosened screws or end-plates, etc., due to vibration or accidental twisting. Another benefit resulting from the absence of any joints is that it forms an absolutely water, oil and dust-tight protection of the vital elements, such as the winding and condenser. Since it can be bored out and machined all in one piece, and because of its rigidity, it is possible to hold more closely the running clearance between the armature and the poles of the magnets.

Should a spark plug cable become disconnected, broken, or should the gap in the spark plug be too great, then the secondary current, in endeavoring to find a "ground," may puncture the insulation of the armature or other parts. To prevent this a so-called "safety spark gap" is provided, and consists of a pointed screw placed in the housing at a certain distance from the collector ring. When the current, for reasons already mentioned, is deviated from its proper path, it will jump across the intervening gap and thus protect the winding and other high-tension insulations.



Type GA High-Tension Eisemann Magneto Fitted with Impulse Starter Used Largely for Motor Truck and Tractor Ignition.

NEW EMERSON-BRANTINGHAM MACHINES SHOWN AT FARGO

Among the new farm implements hauled by tractors which were shown for the first time in the Northwest at the Fargo demonstration, was the Emerson-Brantingham Power-Control disc harrow, and Power-Lift drill. In addition to these the Emerson-Brantingham exhibit contained a three-bottom tractor plow, tractor disc plow, Emerson-Brantingham Gelser thresher and a motor cultivator.

Great interest was shown by the farmers in attendance in the two implements first named as these were shown for the first time in this section, having been seen previously at the Columbus show in the spring.



Emerson-Brantingham Power-Lift Disc Harrow and Seeder Attached to Emerson-Brantingham Tractor at Fargo Demonstration Preparing and Seeding Its Allotted Strip of Ground.

The Emerson-Brantingham No. 70 Power-Control disc harrow is a new model that has been under test for a long time. This implement has found favor with its owners during the present season and a big future is predicted for this new type of disc harrow by tractor owners. The power for angling or straightening the gangs is taken direct from the discs. In case of emergency the gangs can be straightened by working the lever that controls the angle of the discs. The scrapers and gangs are controlled by ropes attached to the tractor seat. It is claimed that it is as easy to handle this harrow as it is to raise or lower a power-lift plow.

The new Power-Lift grain drill, which was also shown at the Fargo demonstration, is the regular machine which has long been so popular with farmers of the Northwest, but is now equipped with a new power-lift device which works on the same principle as the power lift used on Emerson-Brantingham tractor plows and tractor controlled disc harrows.

LOWER PRICES FOR INTERNATIONAL TRACTORS.

The International Harvester Co. of America announces new list prices on Titan and International tractors, as follows, effective at once:

Titan 10-20 model, with friction clutch pulley and angle lugs, \$900; International 8-16 with friction clutch pulley and angle

lugs, \$900; International 15-30, with friction clutch pulley and angle lugs, \$1750.

These prices on the 8-16 and the 10-20 show a reduction of \$100 and on the 15-30 a reduction of \$200. The new prices on the International 8-16 and 15-30 are the lowest ever quoted on these models. The \$900 price on the Titan, considering the equipment now included at the list price formerly sold as extra, also is the lowest ever quoted. The present reductions therefore not only wipe out all war-time advances, but place International tractors on a more favorable price basis than ever before.

TRACTOR WORKS ON CORN THREE FEET HIGH.

Tractor men in Indianapolis are very much interested in a test field of corn just south of the city. The owner of the

field is attempting to cultivate the entire crop with motive power. Tractors were used to break the ground, to prepare the soil for planting and for cultivation up to the present time. With the corn three feet high a tractor was used to draw the



Avery Road Maintainer Finds Favor with Town and County Commissioners—One Man Outfit Keeps Long Strips of Country Road in Best of Condition.

12-shovel, two-row cultivator. The corn sprang up behind machine unharmed.

G. W. Thomas, until recently salesman for the Auto Supply Co., Olney, Ill., has accepted a position as designer for the Apperson Bros. Automobile Co.

ROAD BUILDERS PRAISE AVERY "ONE-MAN" ROAD MAINTAINER

To meet the demand of town, state and county road commissioners for a light tractor which will at one operation scrape and level country roads, the Avery Co., Peoria, Ill., is manufacturing a six-cylinder motor cultivator.

Unlike the heavy type of road scraper, which requires at least two men, and often three, for its operation, the Avery road maintainer is easily run by one man and by removing the scraper blade, which is hung underneath, the tractor may be used for many other power purposes.

The blade attachment of the Avery "One-Man" road maintainer is swung underneath the tractor proper on a sub-frame, which is bolted to the main frame. There are three sections to the blade, which are adjustable as to depth of cut and the curvature of the road, allowing the high spots in the road to be shaved off and the low spots to be filled. Springs are attached at either end of each blade section to absorb the shocks when the outfit is working on rough or rutty roads.

The machine is easily handled, allowing the operator to back up and turn around quickly, which is a decided advantage on narrow country roads. When the end of the round is reached all that the operator finds necessary is to release the steering wheel, which allows the front wheel to act as a caster and, by manipulating the two levers operating the drive wheel clutches, releasing one clutch and allowing the second clutch to remain engaged, one drive wheel will remain stationary while the other will revolve around it, thus turning the tractor completely around, after which the tractor is guided in the usual manner by the steering wheel.

The Avery Road Maintainer is powered by the Avery six-cylinder engine, having cylinders of three-inch bore and four-inch stroke, which develops from five draw bar to 10 belt horsepower, which is considered more than sufficient for this class of work.

MAKE GOOD IN HAULAGE SERVICE

Transport Trucks Found in Every Line of Industry
Well Known for High Standard of Value and Ability
to Stay on the Job

TRANSPORT motor trucks are at present hauling in a commercial way, material of all kinds, and are well represented in every industry wherever hauling is being done. They are found in city service singly and in fleets, in department store service, hauling wholesale ice cream and ice, in industrial haulage both in heavy duty and light speed service, on the farm, hauling produce and supplies to and from market. In fact every line of commercial activity finds transport trucks performing their work in a highly satisfactory manner.

Transport trucks are manufactured by the Transport Truck Co., Mount Pleasant, Mich., and have been on the market for a number of years. They are well known in all parts of the United States wherever trucks are sold.

Tests made with the latest addition to the Transport line with the model 70-7000-pound capacity truck showed the company engineers that there was power to spare even in such hard gruelling work as was encountered during the test runs of the truck under load. Five tons were successfully handled on this run on a truck that was designed for $3\frac{1}{2}$ tons pay load capacity, and as the roads traversed were in poor condition just after a rain which lasted for several days, the result of the test run was all the more remarkable.

Standard units of well known manufacturers are used throughout in Transport trucks and only units that have shown ruggedness in previous performances are used, the object of the engineers being not to see how cheaply a truck could be manufactured, but to manufacture a truck chassis that would go into the hands of users and give satisfactory service 300 to 365 days per year and show economy of operation. That they have succeeded in this is clearly shown by the great number of highly complimentary testimonials which the company is constantly receiving from owners of transport trucks, some from fleet owners and many from owners of a single truck.

Transport Trucks Amply Powered.

The Transport truck line consists of four truck models with tonnages of one, $1\frac{1}{2}$, two and $3\frac{1}{2}$ tons respectively and known to the trade as models 20, 30, 50 and 70.

Model 20 is amply powered by a Buda four-cycle, four-cylinder, L-head vertical engine which develops under N. A. C. C. rating 22.5 horsepower and has a bore and stroke of $3\frac{3}{4}$ by $5\frac{1}{2}$ inches. The engine is cooled by thermo-syphon system and a cellular radiator located in the conventional position. The engine equipment consists of Stromberg one-inch carburetor, Elsemann model S-H magneto and

Simplex governor. The fuel tank is located under the driver's seat and the fuel is fed to the carburetor by gravity.

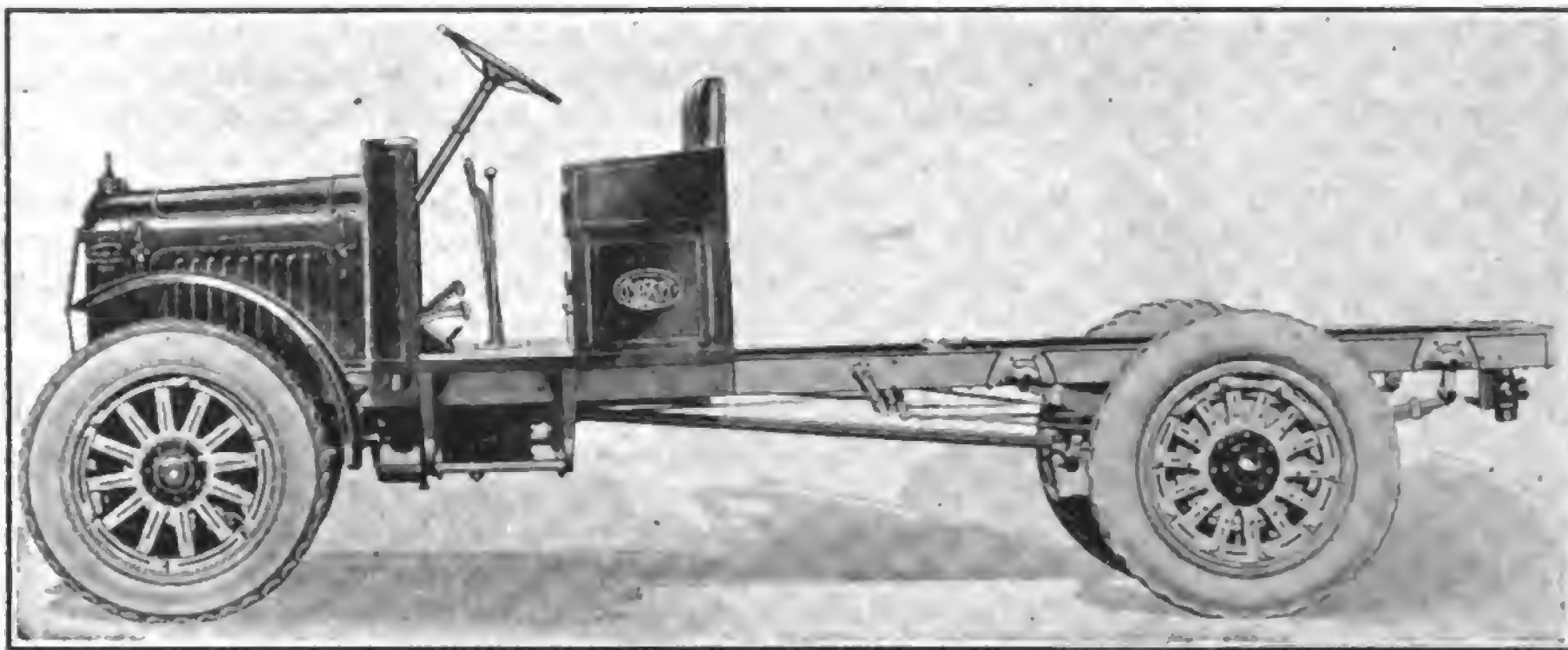
Model 30 is powered by a Continental four-cylinder, four-cycle, L-head, vertical engine, developing 22.5 horsepower and having a bore and stroke of $3\frac{3}{4}$ by five inches. The engine is cooled by thermo-syphon system and a cellular type radiator located crosswise of the frame in the conventional position. A large four-bladed fan is belt driven from the timing gearset.

Model 50 is powered by a Buda engine of the four-cylinder, four-cycle, L-head, vertical type, which develops under N. A. C. C. rating 28.9 horsepower and has a bore of $4\frac{1}{4}$ inches and stroke of $5\frac{1}{2}$ inches. The engine is cooled by a centrifugal pump driven by the power of the

pressure, which assures efficient lubrication of all bearings of the engine and reciprocating parts under all conditions of service.

Clutch and Transmission Units.

Unit power plants are used in all models with the clutch, which is of dry plate type, located in the standard S. A. E. bell housing of the flywheel, while the transmission and gear box are bolted to the flywheel housing, forming a unit construction which is at once simple and easily accessible. Fuller clutches and transmissions are used as standard in models 20, 30 and 50, while a Borg & Beck dry plate clutch and Cotter transmission is used in the model 70. Three speed selective transmissions are used in the models 20 and 30 and four speed selective transmissions in the models 50



Model 20 Transport Truck Offers a One-Ton Fast Delivery Vehicle That Is Complete of Unlimited Service and Hard Usage.

engine, which circulates the water freely through the water jackets of the engine and through the cellular type radiator located in the conventional position. A large four-bladed fan driven by wide flat belt from the timing gearset provides a draft of air which quickly cools the water as it passes down through the radiator core.

Model 70 is amply powered by a Buda four-cylinder, four-cycle, L-head, vertical engine, which develops 32.4 horsepower under N. A. C. C. rating and has a bore of $4\frac{1}{2}$ inches and stroke of six inches. The engine is cooled by centrifugal pump, cellular radiator and four-bladed fan, which provides a very efficient cooling system under all conditions of service.

The Modine radiators are spring mounted to prevent strains of the frame from racking and opening soldered seams on the cellular core; a special Transport design is used, which is protected at the front by metal strips which act as a guard in case of accidents, preventing serious damage to the core.

Lubrication of the models 20 and 30 are a combination of force and splash, while the models 50 and 70 are lubricated by

and 70 with the engine driving direct on high speed.

The universal joints in the model 20 are Thermoid and in the models 30, 50 and 70 of the Hartford type, fully encased in a metal housing which prevents the entrance of dust or the leakage of lubricant. Two universals are used in the model 20 and three in the models 30, 50 and 70. The propeller shaft being supported in the center by a center aligning bearing which prevents whipping of the shaft and provides for the angular drive.

The rear axles used on all models are Clark internal drive, fitted with a dead axle. The final drive being taken from the propeller shaft through bevel gears to spur pinion gears in the wheel hub driving drums. The load carrying member is a dead member.

The springs are of Detroit manufacture of unusual length and strength to withstand the heavy load strains imposed upon them by overloading and carrying the rear axle torque strain through the Hotchkiss drive.

The total gear reduction on high is given as follows: Model 20, 7.2 to one; model 30, 7.6 to one; model 50, 8.15 to



Model 70 Transport Truck Has Gained Much Prestige Among Contractors and Others Who Desire a Heavy Duty Hauler That Can Be Depended on for Satisfactory Work.

one; model 70, 10.1 to one. The gear reduction on low speed is as follows: Model 20, 21.8 to one; model 30, 30.4 to one; model 50, 39.1 to one; model 70, 52 to one.

Chassis Units Have Unusual Strength.

The frames have unusually deep channels and wide flanges of heavy stock which are well braced with cross members and corner braces hot riveted to the side members, which give unusual strength to withstand torsional strains and stresses.

The front axles are drop forged I beams having yokes cast integral and fitted at each end with wheel spindles and steering arms of ample size. The bearings used in the model 20 are Bower roller bearings; in the model 30 and 50, Bock tapered rolls are employed, while the model 70 uses Timken tapered roller bearings.

The Jacox steering gear is used in all models, large hand wheels being used with the spark and throttle levers located on the top of the steering post in the center of the hand wheel. Heavy steering linkage connects the steering hand wheel and post with the front wheels. With the screw and nut adjustable type of steering gear the road shocks are softened to such a point that they are practically eliminated at the hand wheel.

The brakes consist of a foot service brake of the double-acting external contracting type, which is two inches wide, and an emergency, double-acting internal expanding type on the model 20 truck. The foot brake is operated by the driver's foot and the service brake by hand lever in the center of drivers compartment. Both brakes are 16 inches in diameter and the emergency brake is 1½ inches wide.

Model 30 is equipped with a double-acting external contracting foot brake 2½ inches wide and an emergency, double-acting internal expanding brake 1½ inches wide, both brakes operating on 16-inch drums in the rear wheels. The brake linkage is equipped with Transport special evenner and slip yoke, assuring an even pressure on both rear wheels and the same positive control whether the truck is loaded or empty.

Model 50 is equipped with a double-acting external contracting foot brake three inches wide and an emergency brake, hand operated, double-acting internal expanding 2¼ inches wide. Both brakes operate on 16½-inch drums, while the

brake linkage is equipped with Transport special evenner and yoke, assuring the same pressure on both rear wheels and the same positive control whether loaded or empty.

Model 70 is equipped with a double-acting external contracting foot brake, 3½ inches wide, operating on the drive shaft and an emergency double-acting internal expanding brake 2½ inches wide, operating on a 20-inch brake drum. The brake rods are equipped with Transport special evenner and slip yoke ends, assuring an even pressure on both rear wheels and gives the same positive control whether the truck is empty or loaded.

Wood artillery wheels are used regularly on models 20, 30 and 50 and Clark disc steel wheels on model 70. They are constructed unusually heavy, have well seasoned square turned spokes and are built to withstand the constant strain of hard service on all kinds of roads.

Regular tire equipment of the model 20 consists of Goodyear solid tires 34 by 3½-inch front and 34 by four-inch rear, or optional 35 by five-inch front and 36 by six-inch rear truck type cord pneumatics.

Model 30 Goodyear and Firestone standard equipment with solids regular, 36 by 3½-inch front and 36 by five-inch rear, or optional at an extra cost truck type cord pneumatics may be supplied 35 by five-inch front and 38 by seven-inch rear and the truck transmission fitted with tire inflation pump.

Model 50 may be equipped with either Goodyear or Firestone tires as standard. Regular equipment calling for 36 by four-inch solids front and 36 by seven-inch solids rear, or truck type cord pneumatics may be supplied at extra cost and tire pump fitted to the transmission for inflation purposes; the pneumatics recommended for this model are front, 36 by six-inch and 40 by eight-inch rear.

Model 70 is equipped with 36 by five solids front and 36 by 10-inch Giant Cushion tires rear.

Lubrication is supplied to all chassis slow moving bearings, under pressure, by means of Alemite high-pressure system, which assures positive lubrication.

Regular equipment consists of tool kit with a high-grade set of tools, powerful truck jack, oil lamps located inside of dash, tail lamp, motormeter and odometer fully equipping the truck for general commercial service.

The wheelbase of the model 20 Transport truck is given as 130 inches, with

101 inches back of the driver's seat. Of the model 30 the wheelbase is 140 inches with 117 inches of loading space back of the driver's seat. Model 50 has a wheelbase of 150 inches with 123 inches of loading space back of driver's seat, or a long wheelbase truck is available in this model which has a wheelbase of 170 inches with 152 inches of loading space back of the driver's seat. The long wheelbase truck chassis is especially valuable for van bodies, also for hauling lumber and other material where extra loading area is desirable. The long wheelbase chassis is not optional, but may be purchased at extra cost.

Model 70 has a regular wheelbase of 170 inches with 150-inch loading space back of driver's seat, while the long wheelbase chassis is 190 inches in length with 174 inches loading space back of driver's seat for which an additional charge is made.

Transport Dump Body Trucks.

Special emphasis is made that the Transport Truck Co. is now prepared to meet the demand of road contractors, construction engineers, etc., with a special dump chassis known as the model 50C which is 17 feet overall, that may be equipped with solid tires regular or truck type cord pneumatics at extra cost. This chassis is especially adapted to this class of work on account of its short wheelbase, 150 inches, with 123 inches loading space back of the driver's seat, which easily allows the mounting of power operated hoist and dump body. This chassis is fully equipped with all essential tools, lamps, jack, etc., for practically any line of construction work and still is light enough in weight as equipped with pneumatic tires to successfully work on sub-grades without sinking.

To facilitate easy starting and economy in operation all engines of the Transport line are now being equipped with hot spot intake manifold, which adapts the engines to the lower grades of fuel. This device heats the incoming charge of gas before it reaches the combustion chambers, vaporizing it quickly so that it is entirely burned. Economy, long life, ample power for all purposes of haulage, and reliability are the watchwords of the Transport company and wherever Transport trucks are known you invariably find a good word spoken for them.

WHITE CHARLOTTE, N. C., BRANCH.

The new branch office of the White company at Charlotte, N. C., will be in charge of Eugene Kelly, who will have John H. Elder, formerly of the Atlanta office, and J. R. Bowen of Raleigh, as associates. The business in this territory had formerly been handled from Atlanta, Ga.

GOOD SYSTEM.

The State Highway department in Pennsylvania has a very good system of announcing each week the roads on which oiling work is to be done. One of the great nuisances of automobile travel is to come upon a road which has been newly treated with oil and which could be avoided if one had had earlier notice.



Showing Community Thresher at Work in Vicinity of Sterling, Ill.—Advantages of Having Work Done in This Manner Are Many and It Will Pay Forward-Looking Agriculturist to Carefully Consider Proposition from All Angles.

Community Threshing Profitable

Farmers Join with Nearby Neighbors and Purchase Small Outfits That Do Efficient Work—Movement Gaining in Favor.

GRAIN growers know that when grain is ripe it should be cut soon as possible. The longer it stands the riper it gets, and the kernels fall out of the husks and are lost. Therefore, harvesting should be done when the grain is in the right condition.

What is true of harvesting is in a measure true of threshing, for the longer the grain stays in the shock the greater is the chance of its getting wet and spoiling. Birds will also get into the shocks and waste the grain. Winds will tumble the shocks down and wet weather, lasting for any length of time, will ruin it.

The community thresher is not always available when wanted and the result is that grain that would have tested as first or second grade is reduced to third or fourth and the farmer receives his pay accordingly, often taking a severe loss when, if he owned his outfit or three or four neighbors owned one together, the grain would have been saved and a profit made.

Use of Small Outfits Increasing.

Farmers who have purchased outfits or who have joined with two or three nearby neighbors, have found that they can thresh the grain when it is in the best condition, and that early threshing clears the land for early plowing and thus gives the farmer a better chance to harvest a bumper crop the following year. He also has a better opportunity to save grain, as he is not in such a hurry as the custom thresherman and will naturally not operate when the grain is in an unfit condition.

Naturally the women of the farm are quick to appreciate the advantages of not having a motly and heavy-eating threshing crew to cook for and serve, and this is an item to be considered when the cost of threshing is summed up. The farmers in the vicinity of Sterling, Ill., are thoroughly sold on not only the idea of the individual thresher, but on the value

of the Twin City thresher as well, L. C. Johnson, the Twin City dealer at this point, having placed a good many machines in this particular territory.

A few of the reasons for this given by this dealer are worth quoting.

The thresher proves a real grain saver and has a large and ample capacity.

The ease of operation and care required to keep the thresher in operation are of minor importance, while the perfect balance, all-steel construction, roller bearings and range adjustment make it a thresher having unusual long life.

Heavy power is not required for its operation, as it may be run by practically any of the lighter tractors found on the average farm.

Its auxiliary cylinder, large grate surface and wide control make it a thresher adapted to a wide range of use.

The profit to be gained from community threshing may not be realized in dollars and cents at the time but, as the grain can be delivered to market in prime condition. The profit gained accruing from the sale rather than from the hours of labor required to thresh.

Farmers are realizing this fact more and more and the result is seen in the surveys that have recently taken place throughout the country to determine the results of tractors and implements in the hands of owners.

LOOK FOR PRODUCTION OF 400,000 TRACTORS IN YEAR 1921.

It has been estimated that 400,000 farm tractors will be manufactured this year and a total of 10,000,000 within the next 10 years. These figures point a brilliant future for the industry.

At the end of 1920 there were about 325,000 tractors being used, compared with 175,000 in 1919, 140,000 in 1918 and 34,370 in 1917.

In the United States there are 6,500,000

farms divided for tractor needs as:

Fifty horsepower tractors, 160 acres and over, 250,000 farms.

Twenty-five 50 horsepower tractors, 75 to 159 acres, 2,000,000 farms.

Twenty-five horsepower tractors, 25 to 79 acres, 3,000,000 farms.

Below 25 horsepower, all small and garden farms, 800,000 farms.

Present indications are that Argentina will need 200,000 tractors within the next two years; and that, if foreign exchanges return to normal within the next year, about 70,000 tractors will be sold to Continental Europe. According to present inquiries Russia and Germany would like to place orders for about 40,000 tractors.

FARMERS BEST TRACTOR SALESMEN.

An advertisement in a newspaper recently specified that farmers were desired to sell tractors. The reason for this specification is not difficult to discern when one realizes that farmers are as a general rule well versed in the various operations of the farm and although not trained in the handling of tractor power, they are quick to understand its principles and know when farming operations are properly performed.

Long use of horse-drawn implements make them especially useful in selling and demonstrating farm tractors and they get better demonstration results than does the average mechanic, who may understand all about handling and caring for power vehicles, but is inexperienced in the handling of power operated implements.

BOSSERT GOES TO MEMPHIS, TENN.

John Bossert, who has been in charge of Hart-Parr sales in Wisconsin, has been appointed branch manager of the Hart-Parr Co. at Memphis, Tenn.

GARFORD DESIGNED FOR SERVICE

Popular Line Now Comprises Six Models—Years of Experience Behind Company Which Builds Special Truck for All Classes of Work

TWELVE years' experience of building motor trucks for light and heavy duty has placed the Garford Motor Truck Co. of Lima, O., in a position where they know to a certainty just what is required in a motor driven truck for commercial and industrial haulage service.

At the present time six models are manufactured, ranging in capacities from $\frac{3}{4}$ ton to $7\frac{1}{2}$ tons. Each model has been carefully designed to meet the demands of a certain field and class of buyers, and the time spent in designing and testing each model has been ample to bring out any defects which the engineers may have overlooked.

The $\frac{3}{4}$ -ton model has been designed especially to meet the demands of those who require a light weight fast delivery truck, suitable to handle suburban and city delivery in a quick and expeditious manner, operating at a low cost per ton mile.

This model is known to the trade as model 15 and embodies in its construction many of the well known features which have made the name of Garford famous wherever good trucks are sold.

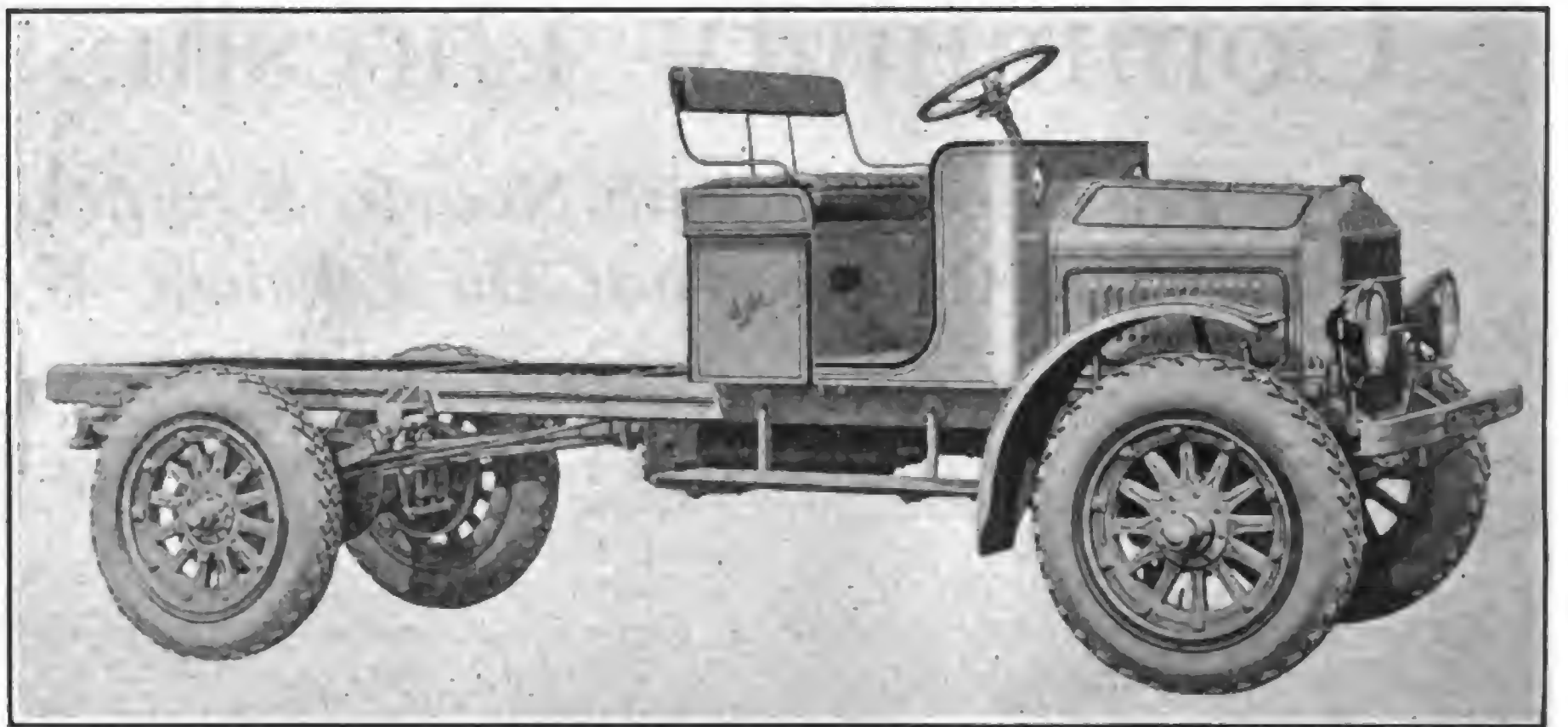
The model 25, $1\frac{1}{4}$ -ton capacity truck follows the same general lines as the model 15 and is designed heavier throughout for the express and freight trucker who desires a light weight, fast delivery truck that can be operated at a low cost per ton mile. This model finds ready sales among farmers and others who desire a speedy truck having ample carrying capacity for the delivery of produce and other products of the farm. Industrial concerns find this truck of ample capacity for freight and express service, where the loads are varying, carrying

the loads at a low cost both for operation and maintenance.

The model 70-H, two-ton Garford truck was built to fill the requirements of that large class of haulage which is between the light or "package" class and the "heavy duty."

Here sturdiness and power are essential and a certain degree of speed are re-

powerful truck strictly in keeping with Garford quality throughout and at a reasonable price. This Garford model, which is the result of 12 years' experience in quality manufacture, is claimed to do more work, do it better, and at lower ton mile cost, than other trucks of similar capacity. To fully appreciate the power, strength and the unusual desir-



One and One-Half-Ton Garford Chassis Especially Designed for Use in Express, Freight, Farm and Interurban Service.

quired. This Garford model is capable of transporting its load with the same ease and dependability that have made for the entire line an enviable reputation for exceptional performance.

The model 77-D Garford $3\frac{1}{2}$ -ton truck was designed with the firm belief that in this model would be found a staunchness, quality and sterling value which would literally establish a precedent.

In designing and building this truck the purpose which the company had in view was the construction of a capable and

ability of its general construction one must actually inspect this truck and doing so one will gain a new and higher standard of value it is said.

The model 68 D, five-ton truck has been developed to handle the big jobs of heavy hauling, and to withstand the strain and stress of hard going under heavy loads. In the design, material and workmanship of this truck is found the result of long years of successful truck building by master minds experienced in designing and constructing heavy truck units.

The Model 150 A, $7\frac{1}{2}$ -ton capacity Garford truck, simplicity of design and rugged strength of its units characterize its construction. Embodied in its development are the fruits of 13 years' experience in creating and manufacturing low cost ton mile transportation, every possible consideration being given to the heavy hauling tasks for which it is built.

In manufacturing a chassis of this capacity Garford has enlarged on their efforts to produce a truck for every purpose.

Look occasionally to see whether the shoes are biting on the drum or on the ridge at the side of the drum.

The ridge is not meant for the brake shoe lining.

Compensating pulleys work better if oiled.

Do not ask to see the old parts after a repair; it is so easy for a man to show you parts taken from another car.



Garford Three-Quarter-Ton Speed Truck Has Special Appointments Desired by Purchasers.

DOES THE TRACTOR PAY ITS WAY?

This Authority Says Yes—Provided the Farmer Selects Proper Equipment and Uses It Efficiently—Experts See Big Future for Power Farming

THAT American farmers are the most careful buyers in the world is an axiomatic statement that holds good when this class of citizens become prospective purchasers of tractors or other farming implements. Farmers interested in this modern time and labor-saving agent must have every question answered in regard to its cost, operation and maintenance, and every objection must be met with conclusive argument backed by actual proofs.

To get the real status of the farmer on the tractor question, one of the leading implement manufacturers of the country recently asked its customers what they thought about the tractor. Some of these men owned tractors; others did not; some favored them while others criticized. The favorable comments were so general and the points mentioned so universally known that it is not considered necessary to dwell upon them. But the unfavorable comment and objections, as they came in from the field, are worth careful analysis.

This matter was ably treated by J. B. Bartholomew, chairman of the National Tractor Demonstration and Show Committee, at a recent Bankers' and Manufacturers' banquet.

"For convenience I have classified these under four general heads," says Mr. Bartholomew. "Finance, which includes expense and depreciation; character of land; the place of the horse, and is the farmer mechanically able to operate the tractor successfully?"

"The first big objection is lack of finances and this strikes one not as an objection to the tractor and not even true, except in a limited number of cases. But it might be considered a slam at the biggest industry in the United States, farming.

"Finance is a question that confronts every activity and is really the question confronting the farmer and everyone else when they are considering the purchase of anything that they might want. Therefore, this objection does not apply, generally, nor does it tend to condemn the tractor. Neither can it be applied to farmers who are able to finance their tractor purchases.

"The thing to consider is, What will it do? What will it save? What revenue

will be derived? Then make an investigation and see what can be done and reach a conclusion after you have interviewed the banker, the local agent, the manufacturer's representative and others who might be interested in affording a solution to the financing question. Several institutions have already been formed to meet such requirements.

"Fifteen years ago two factories located in close proximity were considering the installation of a sprinkler system. It was figured out that in 4½ years the saving in cost of insurance would pay for the installation. One of these factories installed it immediately. It paid for itself in 4½ years and it has paid for itself twice over since. The other factory said they could not finance it—it was too costly. They still haven't installed it; they have paid for it over three times; they still haven't got it, while they fully realize their false economy.

"A good many farmers are in a similar position. They don't own tractors, but they have paid for them several times over.

"Of course it is not always the first cost that keeps a farmer from buying the tractor he needs. Some farmers say they are too expensive to operate or that their

farms are too small or that the life of a tractor is too short and depreciation too high, but these objections will not hold when they are carefully analyzed. For example: On this question of depreciation, tractors in proportion do not figure out to be any more expensive in the first cost than other lines of improved farm machinery.

"We sometimes hear that land is too expensive—too high in price—and it certainly would be if it were not for the modern farm implements available with which to work it. How much worse off would the owner of the high-priced land be if he had all of the implements with which to work it economically and profitably and did not have available proper power with which to operate the implements or the belt-driven machinery incident to up-to-date and economic operations?

"There is no implement or machine on the farm, unless it be the automobile or the truck, that is so much used during the year as the tractor when once adopted. Many say that the time saved by the use of the tractor justifies its cost, without figuring any of the earnings or the more economic way in which it will do the work.



Operating Corn Cutter at 10 Below Zero Near Niles, Ia.—The Picture Is Prophetic of What Is in Store for the Northern Farmer This Winter—How Much Harder It Would Be Without the Tractor.



Uprooting Apple Tree, Clearing Ground for Golf Links at Country Club.

"Plowing at the right depth at the right time; making the proper seed bed at the right time; seeding and planting at the right time, all more or less made possible by the use of the tractor, are regarded as elements that justify the farmer in owning and maintaining them. These statements are made by successful farmers.

"With the tractor it is not necessary to start plowing or doing any of these farm operations when the soil is not in prime condition. Therefore, better crop yields and that too, without drawing any more on the soil fertility for the eradication of weeds, is more cheaply and more successfully accomplished, by plowing at the right time.

"It is difficult for one who has not had tractor experience to realize the greater capacity of the tractor, the wider range of work that can be covered in the same time, and how thoroughly the work can be done because of a properly selected tractor. A little deeper plowing, a more thoroughly made seed bed and a much wider range of work is accomplished by one man than can possibly be accomplished with horses, because one man cannot successfully handle a sufficient number of horses.

"Much has been written about the wonderful work done by the tractor at the front during the great World War. But we seem to have overlooked the great work done by the tractor in the field of our great area of fertile lands, many of which tractors were purchased before the great war was dreamed of, and a great many more purchased during the period of the war. These are the machines that did the big work in producing the surplus food available to supply not only our own great army, but in a large way the armies of our allies. A very large per cent. of these tractors are still in successful operation, going ahead serving the purchasers after repaying their cost many times over.

"Suppose you take a tractor and figure it on the basis of four years' life. You charge up for the first year 40 per cent. of its cost, the second year 30 per cent., the third year 20 per cent., and the fourth year 10 per cent. against its operation. This would be considered a liberal method of depreciation. And then you pick up a letter dated Dec. 1st from the purchaser, which contains the following language:

"I purchased one of your tractors last July. I have plowed 4300 acres of land,

threshed 125,000 bushels of grain. It has more than paid for itself and runs as good as new."

"The above sentences and thousands of others, testifying voluntarily in behalf of the tractor, are available.

"If we are not willing to take the statements made by the users, then we should be willing to take their actions, and if after purchasing, they continue to use them, it is then evidence that they are successful.

"If the farm is small, select a small tractor and farm it the tractor way. The smaller the farm the more expensive per acre it is to farm with horses, because horse expense goes on while tractor expense stops the moment you stop operating.

Select Proper Size Tractor.

"Tractors have been successfully employed to haul off of the land all stones that seriously obstruct farm work either with tractors or horses. They have been very successfully used in ditching, diking and levelling land and bringing it up to a high state of cultivation.

"Beautiful farms have been made by the use of a tractor pulling the stumps and dragging them away, and attention is here called to the fact that thousands of acres in the United States of underground

stump lands have been cleared by the use of tractors and brought to a high state of cultivation.

"When you farm the tractor way the shape of the field does not interfere with the successful use of the tractor, and in loose, sandy soil it is simply a question of the proper wheel lugs.

"Therefore, such conditions are fully met by the tractor when the proper size is selected and proper wheel equipment is used.

"One hundred years ago 95 per cent. of the people were on farms—today only 49 per cent. are on farms. Therefore, we may take it that improved farm machinery has enabled 49 per cent. of our people to produce food, not only for themselves, but for the other 51 per cent. Such a condition could not have been brought about without the improved farm machinery. This process is still going on and the tractor is in the great scheme. We are a nation of industry—but all those doing other things than farming must be fed by the farmer. The farmer must also promote industry because the workers constitute the consumers of his products.

"It is often claimed that you can't make as good a seed bed with tractors as with horses, as it is claimed that tractors pack the ground more than horses and flatten it out and make it hard. If there is any merit in these objections it is because an attempt has been made to farm with the tractor in the same way that farming is done with horses. The advantages of the tractor are more than apparent when farming is done with the tractor, the tractor way. It certainly would not be proper to go on to the soil, either with horses or tractors, when the conditions are unfavorable.

"A good deal has been said and printed to the effect that the purchase and use of tractors has killed the horse market so that farmers with too many horses cannot get rid of them and must maintain the horses just the same. The objections



Cutting Silage with the Automotive One-Man Line-Controlled Tractor.

classified under this head are all horse questions, while they seem to admit that the tractor is the cause of the difficulty.

"The progress of the world cannot be stopped and the history of the United States does not disclose a single instance where a new industry has been stopped without putting something in its place. The people of the United States do not turn backwards. All the objections that were made to the first railroad project, the spinning machine, the roller flouring mill, the telegraph and the telephone, the steam thresher, the automobile, etc., have long since been forgotten.

"Of course, it is easy to farm with horses, but the American farmer is the best mechanic in the world and it is not necessary to have experts to run tractors any more than it is necessary to have an expert to run an automobile. Every farm child has been brought up in an environment which brings him in close contact with modern machinery as it is employed on the farm. He plays about it when he is idle and his interest in it when it is in operation is very great. Many times before he is large enough to operate such machinery he knows and understands its mode and method of operation.

"Is he the natural-born mechanic we hear about? Of course he is not a natural-born mechanic—his environment has simply brought him in contact with machinery at an early stage in life when his mind was in a receptive mood to study and understand it.

"The farmers of the United States have very greatly improved their condition as a result of their own efforts in planning out and making machinery to meet their own requirements. Most of the great inventors trace back to their early experience as farm boys the time when they received their first vision, the result of which was a great invention.

"While it is admitted that the horseless farm may be the ideal to look forward to, as yet it has only been realized in a limited number of cases. The basic idea of the tractor is to reduce the use of horses to the minimum because of the enormous expense incident to their production, up-keep and maintenance.

"There are a great many who do not know how to care for horses properly.



The Tractor Is Certainly an Efficient Ally During the Haying Season.

They do not know how to drive and handle them correctly. They seem to have no conception of the peculiar disposition of different horses. They sometimes fight and scold them when they should be gently treated, and they are many times misused, abused, disabled and sometimes destroyed at the hands of incompetent horsemen. You cannot fix a horse with a monkey wrench. It does not require any more effort or study to become an expert tractor operator than it does an expert or competent horseman.

"They farm intensely in some parts of Europe, and they do it with the spade, shovel and hoe. The areas that they cover are small per man-power and man-power in many parts of Europe is much cheaper than in the United States. It is one thing to make a small area (by intensified and hand cultivation) produce phenomenal yields, but the world is fed by the food that is produced by the American farmer, who farms extensively and mechanically, and it is by such methods that the American farmers have so strongly entrenched themselves in their position, while the farmers of the other countries operating on the other plan have just barely got along."

PREPARATION OF THE METALS TO BE NICKELLED.

First immerse the articles for some time in a boiling hot solution of caustic soda or potash; next, rub them thoroughly with a brush, then rinse with cold water and finally dip them in an acid

pickle consisting of one part of sulphuric acid and two of hydrochloric acid to 10 of water, after which they are again rinsed, thoroughly rubbed with finely washed pumice stone or Cienna lime, rinsed off and at once brought into the bath.

Brass, bronze, Britannia metal, etc., are also treated with a hot solution of caustic soda or potash, then rubbed and brushed, rinsed with water and at once placed in a solution of cyanide of potassium. They are then cleansed with a bristle brush kept for that purpose, carefully rinsed in water and at once brought into the bath. The variegated colors produced upon brass by the action of the solution of caustic soda disappear almost instantaneously in the solution of cyanide and a bright surface of the metal is sure to be obtained. Special attention must be paid to the careful rinsing of the articles, especially if they have hollow places and depressions, after they have been treated in the solution of cyanide of potassium to prevent the nickeling bath from being contaminated by the cyanide. For many articles of brass having more or less matt and polished places it is sufficient to dip them (after having been freed from all fatty substances by boiling potash and subsequently rinsing in water) in the mixture of acids, then to rinse them again, and to bring them at once into the bath. For iron articles the use of finely sifted pumice stone or chalk is absolutely necessary. Copper wire should be tightly wound around all articles of metal and two or more wires around large articles. In articles consisting of two metals, for instance, iron with steel or with brass, the wire must be wound around both metals. Smaller articles are suspended from copper hooks. The articles should not be immersed in the nickeling bath until the battery or machine is in action. The suspended articles remain in the bath until they have acquired a white color which, according to the strength of the electric current and the number and size of the articles suspended, will require from five to 30 minutes. Large articles of steel or iron require longer than brass, copper, etc., and if they fill the entire bath, must remain in it, according to circumstances, for several hours or an entire night. In case the article to be nickeled assumes a gray or black color or feels gritty or rough, the current is too strong.



Plowing with Three-Bottom Plow in 30-Year-Old Alfalfa Sward.

HEATH METHOD OF CARBURETION

Principle Used in Well-Known Carburetor Conforms to Fundamental Requirements for Homogeneous Mixture—Breaks Fuel into Fine Particles Resulting in Wide Range of Flexibility

(By FORREST A. HEATH, President, Heath Products Corporation, Detroit, Mich.)

THE fundamental requirement in carburetion is for a homogeneous mixture. While this was recognized by some of our foremost engineers in the early stages of the automobile industry, it was generally neglected by inventors and designers, who proceeded on the assumption that the problem lay in the securing of proper proportions of fuel and air.

The best results were secured with the fuel broken up into fine particles, and designers proceeded with various means of securing high nozzle velocity. The growth of the automobile industry concentrated attention upon motors subject to variable speeds and loads; and inasmuch as fuel nozzle velocity was variable and as piston suction varied, the degree of homogeneity was in itself widely variable.

But there appeared another variable which became recognizable as the bane of the carburetor, and thousands of inventors and designers are still spending their time in an endeavor to overcome it. Homogeneity became lost sight of as a distinct problem, and the second question was attacked from an erroneous standpoint. This question concerned the apparent demand for a rich mixture for power and a lean mixture for economy. Before taking up the subject of homogeneity, the securing of which reduces carburetion to a simple demonstrable science, we will refer briefly to the variable fuel error, from which has sprung the tangled growth of mystery, contradictory theories and mechanical complexities of conventional types of carburetors.

With the fuel adjusted for best motor operation at high speeds (high piston frequency), the mixture is apparently too lean at slow speeds (low piston frequency). This appearance is a mirage. At low nozzle velocities the fuel particles or globules average much larger than at high nozzle velocities. The surface area of the larger globules is less in a given mass than in the case of smaller globules. It is the exposed surface of the fuel particles which determine the amount of heat to be absorbed in evaporation. If a fuel globule be broken up into eight smaller globules, they will possess twice as much surface area as the original globule. They will, therefore, evaporate twice as rapidly as the one globule containing the same amount of fuel. The larger fuel particles are broken down so rapidly under the heat of compression that the interiors coke out pure carbon. This portion of the fuel is wasted as a source of power, and additional fuel is required to make up the loss.

But this is only part of the difficulty.

The high nozzle velocities spray the small particles through the air. At low velocities the particles are not only larger and less thoroughly sprayed through the air current, but they spurt from the nozzle in intermittent groups.

THE MISSION OF THE MOTOR TRUCK.

Yes, the motor truck has a mission to help man get more pleasure and less drudgery out of life and do more work in less time.

Up in Maine a farmer started at midnight with a team making farm to farm collection of milk and reaching the railroad station just in time for the morning freight. The roads were good and his loads consisted of an average of 300 gallons.

A 1½-ton truck, equipped with pneumatic tires and an ordinary stake body, enables him to start out at 5 o'clock in the morning, collect his milk and still be in plenty of time for the freight. It only requires an hour's actual running time for the truck to make the round trip of 16 miles.

Instead of reaching the farm again about noon, thoroughly exhausted, he now gets back early, feels fine and ready for a real day's work on the farm.

Readers who are farmers, or who have had some such experience, will appreciate what this means. When these facts are considered, it is puzzling indeed to know why so many farmers are content to get up at midnight and trot along with their teams.

due to the intermittent suction impulses of the motor, which condition gradually grows more pronounced as piston frequency diminishes.

Waste is therefore caused not only by (a) the large particles, which molecular attraction causes to flocculate and to

become larger through close association in the groups, but also by (b) the impossibility of securing a constant rate of flame propagation in the cylinders from the combustion of a mixture varying in density as it must where the fuel is present in groups.

During recent years fuel has gradually become less volatile, which emphasizes the situation presented in (a). This aggravated difficulty has been overcome in degree by the use of more heat in the carburetor air and by "hot spots" in manifolds. The difficulty itself has not been removed, and the greater obstacle to maximum efficiency stated in (b) is still present.

It has not been unnatural, therefore, to ascribe carburetor trouble to low-grade fuel when in reality low-grade fuel has simply served to emphasize the shortcomings of carburetors.

Since the engineering department of Locomobile company, under A. L. Riker, put an auxiliary air valve on a Longue-mare carburetor about the year 1904, carburetor designs have varied from simple alternatives to complex substitutes, but the fundamental requirement for constancy in the size of the fuel particles and homogeneity in the mixture that leaves the carburetor has been neglected so far as appears in the literature and designs with which the commercial world has been familiar.

About the year 1904 Lester E. Heath built into a carburetor a revolving mesh cage through which the mixture was sent before entering the motor, which demonstrated very plainly the fundamental requirement and one way of meeting it. The revolving mesh cage was an obstacle to commercial use and it was not until 1911 that there was evolved a method of accomplishing the desired results without moving parts or other objectionable features.

Through the courtesy of Mr. Riker of the Locomobile company tests were made on the blocks and on the road, and the results and conclusions were set forth in a paper read before the Society of Automotive Engineers at Madison Square Garden, New York, in January, 1912, by Forrest A. Heath, the designer.

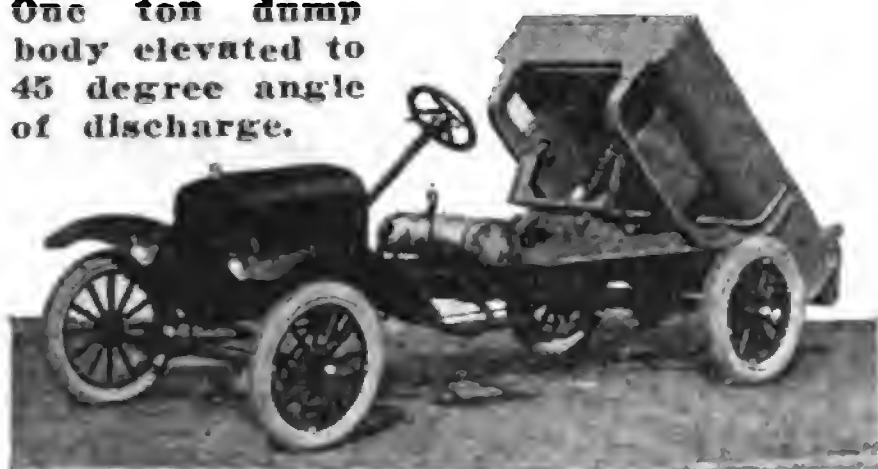
The principle involves a means of setting the mixture of fuel and air into spiral rotation and passing it through spaced interferences placed transverse the path of the mixture. There had been innumerable meshes used, also several kinds of swirlers; but the passing of a swirling mixture through stationary spaced interferences, such as exist in a coarse wire mesh, was recognized by the patent offices of the principal countries as distinctive and original, and basic claims were granted.

Special Winsor Gravity Dump Bodies For Ford Trucks

Light, low cost, gravity dumping bodies of one, two, three and four yard capacity. Dumps load at a 45-degree angle by simply operating lever in the driver's cab. Adjustable rear gate for spreading material. Winsor Gravity Dump bodies are made of steel, hot riveted at all joints. Easily and quickly attached to

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One ton dump body elevated to 45 degree angle of discharge.



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The effect of this construction is to break up the heavier element (the fuel particles) into fine globules of approximate constancy in size and evenly diffuse them through the air. This creates a homogeneous mixture such as an egg beater produces from the whites and yolks of eggs, and the functioning is as though the beaters remained stationary while the mass rotated through the interference elements. The result is the immediate demand for a constant ratio of fuel to air in the carburetor. The effect is an increased thermal efficiency averaging 33 1/3 per cent. and the appearance of power and economy as concomitants instead of alternatives.

This situation may be approximately attained with any of the recognized types of carburetors under the combined influence of the following conditions: Atmospheric temperature permitting the maintaining of an ideal temperature in the motor; low vapor pressure; smooth road; constant speed; superheated manifold transmitting heat to the walls of the carburetor, or superheated air supplied to the carburetor. These conditions permit a "lean adjustment" of the carburetor because they combine to create an approximately homogeneous mixture of small fuel particles between the carburetor and motor cylinders.

If the homogeneous mixing feature be inserted under these circumstances the result is a further decrease in motor vibration, an increase in power, and the appearance of a wider range of flexibility.

It is natural when demonstrating a carburetor to seek the assistance of every condition tending to enhance the result, and herein lies the explanation of a fact frequently referred to as peculiar, namely: that every new carburetor design put on the market has been accompanied by the claim of 25 per cent. fuel saving, which is what a 33 1/3 per cent. increase in thermal efficiency involves.

It also explains why air-cooled motors, which attain an operating temperature quickly; water-cooled motors with superheated manifolds, and high piston frequency motors, show higher mileages when operated with dash controlled carburetor adjustments.

The most noticeable feature in the operation of a motor on a constant, mechanically created, homogeneous mixture, is a marked smoothness and quietness in the motor and driven parts, accompanied by a wide range of flexibility and an instant, or "lively" response to changes of throttle.

Considerable time was spent in perfecting and simplifying the mixer design used in the 1911 Locomobile test, after which was taken up the development of a carburetor involving the simple fuel and air metering requirements disclosed.

Best Results in Fuel Metering.

It was learned that the best results in fuel metering could be obtained with the fuel under a head. Also there appeared the practicability of eliminating the troublesome float mechanism.

The designs evolved from this develop-

ment work have taken concrete form in the carburetors manufactured by the Heath Products Corporation of Detroit.

F. Everitt, a well known manufacturer, told the writer of an interesting practical demonstration at a large automobile plant in Detroit in 1918. Twelve old motors were in the service department for the removal of rattles and knocks. After a week of unsuccessful effort Mr. Everitt suggested to the workers that an experimental carburetor designed by the writer be attached to each one of these motors in turn and the effect noted. Objection was offered on the ground that two of the best known carburetor manufacturers in the country had spent much time and money in competition for the company's business, and had produced instruments which seemed to give the best possible results. It was therefore felt that the trouble could not lie in carburetion. The test was made, however, with the result that the rattles and knocks disappeared from each of the 12 motors in turn, and the service work was stopped.

Heath carburetors produce a homogeneous mixture of definite quantities of fuel and air. They do not depend upon piston frequency or nozzle velocity for carbureting. Their power curves plot geometrically and show increases running inversely as the speed. Their torque curves have higher peaks and show less depression under diminished piston frequency than certain other carburetors now on the market.

TRUCK MANUFACTURERS ENDORSE WOOD-DETROIT HYDRAULIC HOISTS AND STEEL DUMP BODIES

WOOD Hydraulic Hoists

Truck manufacturers realize that every part of the equipment either standard or special must stand up under most rigid conditions, severe tests and usage, hence the adoption as standard the Wood-Detroit Hydraulic Hoists and Steel Dump Bodies by most of the truck manufacturers of the country.

The Wood-Detroit Hydraulic Hoist is so widely used that it has been called the "universal hoist" and is noted for its rugged, sturdy construction, dependability and simplicity of installation and operation.

The following partial list of manufacturers that standardize on Wood-Detroit Hydraulic Hoists:

Acason	Garford	Lewis-Hall	Republic	Swedish-Crucible
American	GMC	Locomobile	Reynolds	Tiffin
Armleder	Gramm-Bernstein	Maccar	Rowe Motor	Triangle
Atterbury	Hamilton	Mapleleaf	Sanford	Traylor
Bessemer	Independent	Moreland	Schwartz	Truck Engineering
Brockway	International (Mack)	National	Selden	Union Motor
Corbitt	International Harvester	Noble	Service	Vellie
Clydesdale	Jackson Motor	Nelson	Signal	Ward-LaFrance
Day-Elder	Kelly-Springfield	Packard	Standard	Watson
Defiance	Lange	Paige-Detroit	Sullivan	J. C. Wilson
Denby	LarrabeeDeyo	Pittsburgh Motor		

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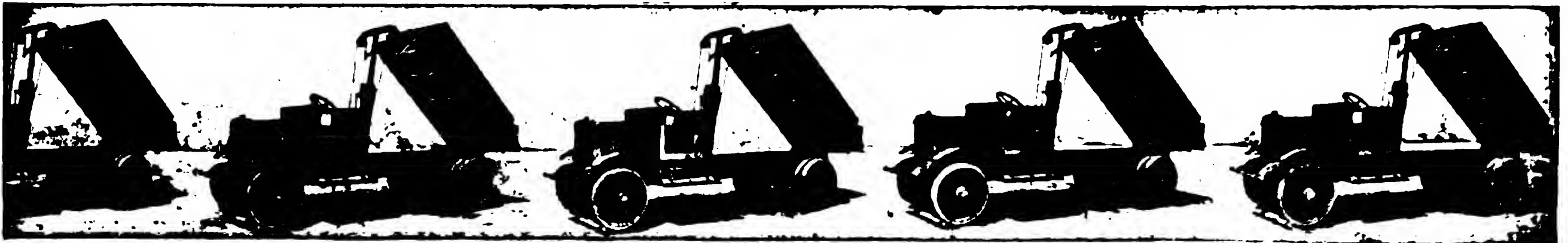
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St. Louis
Denver

Cleveland
Pittsburgh
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Philadelphia

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WOOD DETROIT HYDRAULIC HOIST & BODY CO., DETROIT, MICHIGAN.



EVERY
Acason
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TRUCK**

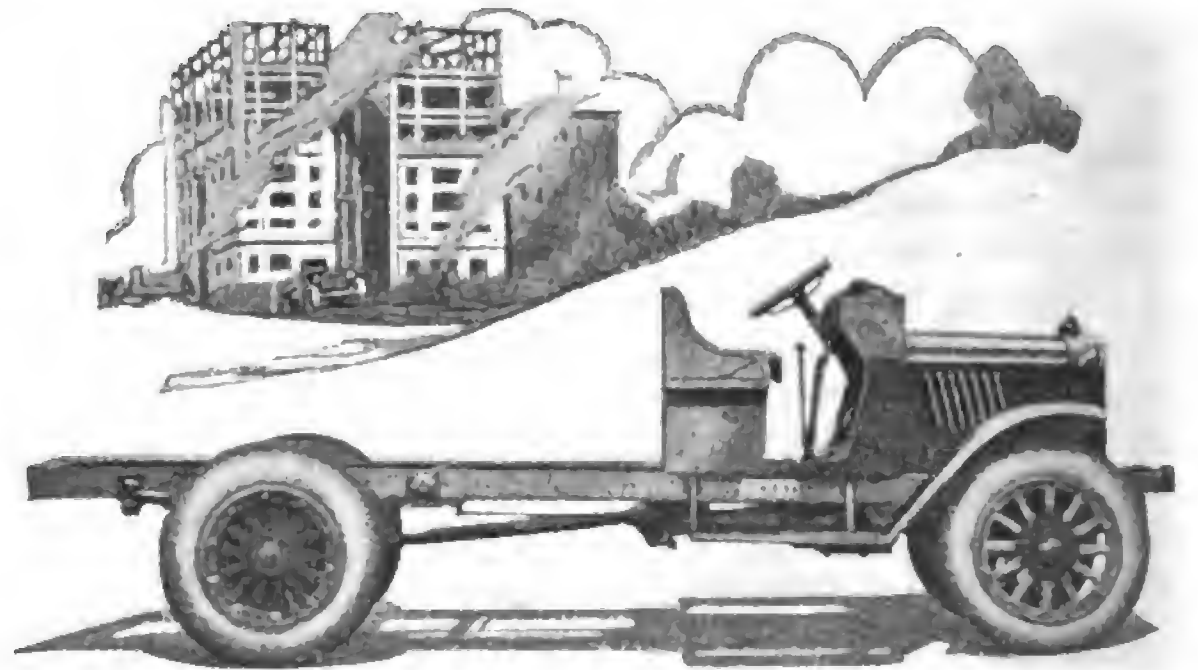
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Complete in every detail. Send for
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ACASON MOTOR TRUCK COMPANY
Detroit, Mich.

DENBY MOTOR TRUCKS



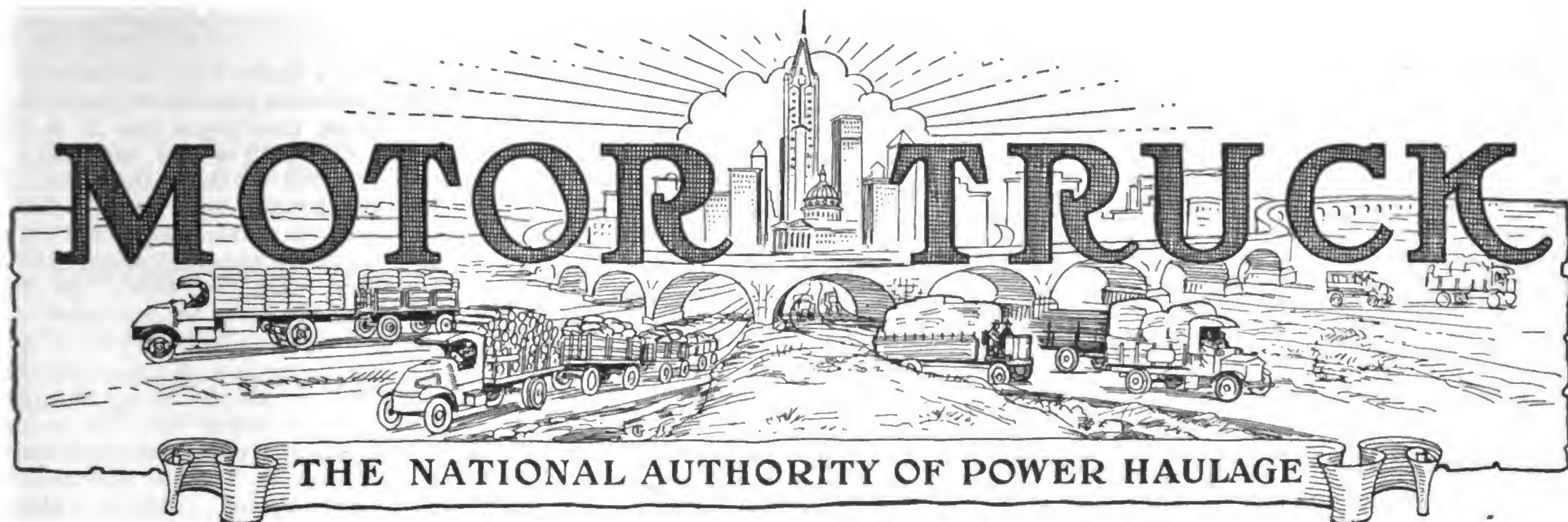
MODEL 33-1 $\frac{1}{2}$ Ton

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A new model combining dura-
bility, economy, speed and ap-
pearance and suitable for many
needs in motor truck transpor-
tion.

Denby Motor Truck Co.
Detroit, Michigan

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)



VOL. XII. NO. 10.

PAWTUCKET, R. I.

OCTOBER, 1921.

Mountain Truck Service at Railroad Rates

*California Trucking Concern Finds Little Difficulty
Competing with Railroad in 126-Mile Haul Across
Rugged Mountain Ranges of Pacific Coast State.*

(By M. R. BRIGHT, Manager, Bakersfield and Los Angeles Fast Freight, Los Angeles, Cal.)

MOUNTAIN ranges are no obstacle to motor truck transportation on the Pacific coast, where truck lines are regularly serving many out-of-the-way communities high up in the rugged back country, or are taking short cuts over the mountains to interior points. While a truck can force its way up a steep earth grade in good weather, the matter of operating expense controls the situation, and it is only on the paved routes that one finds a short-cut line—Bakersfield to Los Angeles, for example—that is able to continue in operation against railroad competition.

The route covered by the Bakersfield and Los Angeles Fast Freight is 126 miles long and includes a climb of over 4000 feet through El Tejon pass and a corresponding descent on the other side. On the 35 miles of road that lie in the mountains proper there are 1140 curves. In summer the heat in the San Joaquin valley, where Bakersfield is located, becomes intense, adding to the difficulties of truck operation. Yet the rates charged by truck are identical with the rates by rail on many commodities, and are practically the same on most articles. And this is for over-night service instead of the 2½ days usually required on the railroad, which has a materially longer haul.

IN CALIFORNIA all motor lines are under the jurisdiction of the State Railroad commission, which grants franchises only when the need for service can be shown and only to those companies that can demonstrate their ability to handle the business that may be offered.

The policy is to grant but one franchise for any given line so that the truck operator is protected against cut-throat competition, and can devote his energies to building up his



The Perfectly Protected and Superelevated Curves of This Concrete Road in Southern California Make Reasonable Speeds Possible for Freight Traffic.

business. In the matter of rates and service, the public is protected by regulations of the State Railroad commission and by railroad competition.

Shipments may be left at either the Bakersfield or the Los Angeles terminal up to 6 p. m. with the assurance that the goods will be at the other end of the line by 10 o'clock the next morning.

Every evening two or three trucks are dispatched from each terminal on this run and have no

difficulty in making the climb over the mountains in time to reach their destination by the opening of the business day, even when they have a number of shipments to deliver en route at the several settlements in the mountains, which are entirely dependent upon motor transportation.

A large fire-proof hotel is nearing completion at Lebec, which is at an elevation of about 4000 feet. Hotel Durant, as the new resort will be called, is a reinforced concrete structure located along the state highway 41 miles out from Bakersfield, the nearest railroad point.

All the material needed for its construction, except the stone and sand for the concrete, and all the furnishings, had to be trucked out from Los Angeles or Bakersfield, and a great deal of material for the building was handled by the B. & L. A. Fast Freight.

The equipment employed on this line consists of 3½-ton Morelands and five-ton Pierce-Arrows. These trucks have special stake bodies which were made unusually strong to withstand the pressure as the machines round the sharp curves. The loads are protected by heavy canvas coverings.

Opportunity to Observe Effect of Road Surfaces.

Opportunity is given on this run to observe the effect of type of pavement surface on operating expense, as there are long sections of concrete and of other materials. Investigation has shown that gasoline consumption is very materially lower on the concrete than on the other sections.



This Section of the Concrete Paved Ridge Route from Los Angeles to Bakersfield is Part of Route Covered by the Bakersfield and Los Angeles Fast Freight Line.

Deterioration of tires is another important item in the cost of operation, and the biggest factor here has been found to be the effect of heating in the rubber, which gradually lessens its vitality. Heating is very noticeable on sections of the non-rigid types, but is very much less in evidence on the concrete, although practically all of the mountain section, with its curves and grades, is paved with concrete.

When the matter of safety is under consideration there is no comparison, as the concrete pavement never becomes slippery and can always be easily followed on the darkest night. For motor truck operation heavier roads are needed than have been built on many of the California highways, but an unsurfaced concrete slab of adequate thickness is undoubtedly the choice of the trucking fraternity.

The new Harbor truck highway connecting Los Angeles with the city's harbor at San Pedro is an excellent ex-

ample of a heavy duty pavement—eight inches of reinforced concrete.

Shipping practise on the B. & L. A. Fast Freight is very similar to that followed by the railroads. A way bill is made out for each shipment and the driver takes two copies with him, one to be left with the consignee and the other to be signed by the latter and returned to the office.

Cargo insurance is carried on each load for \$5000, and additional insurance is taken out for more valuable shipments. The principal commodities carried are groceries, meats, hardware, paints, tires and automobile accessories. A special freight classification—Monroe's—has been adopted by 19 truck lines operating out of Los Angeles. This is similar to the railroad classification, with the classes one, two, three and four.

Before a driver is taken on he must show that he is experienced in mountain driving and, moreover, that he is careful. It is poor business policy to entrust a heavy truck with a valuable load to anyone except a skilled driver when a collision may mean a drop of hundreds of feet. So far not a single complaint has been received about the drivers from either highway patrolmen or private individuals.

Thanks to California's extensive hard road system, motor truck operation has been placed upon a permanent and paying basis. The net work of paved highways is constantly being extended, and both passenger and freight motor transport service keep pace with the completion of new lines.

CALENDAR OF COMING EVENTS

Oct. 1-8—Richmond, Va., State Fair.
Oct. 1-8—Chattanooga, Tenn., Inter-State Fair.
Oct. 3-6—White River Junction, Vt., State Fair.
Oct. 3-8—Birmingham, Ala., State Fair.
Oct. 3-8—Salt Lake City, Utah, State Fair.
Oct. 3-8—Muskogee, Okla., Free Fair.
Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolese, Paris.
Oct. 8-15—St. Paul, Minn., National Dairy Show, Minnesota State Fair Grounds.
Oct. 8-23—Dallas, Tex., State Fair.
Oct. 10-15—Indianapolis, Ind., Indianapolis Industrial Exposition, Indiana State Fair Grounds, Auspices of Indianapolis Chamber of Commerce.
Oct. 12-14—Chicago, Ill.—28th Annual Convention, National Implement & Vehicle Association, Congress Hotel, H. J. Samiet, Secretary, 72 West Adams Street.
Oct. 15-22—Pittsburgh, Pa., Fall Show, Automotive Association.
Oct. 15-25—Atlanta, Ga., Southeastern Fair.
Oct. 17-22—Raleigh, N. C., State Fair.
Oct. 17-22—Jackson, Miss., State Fair.
Oct. 19-21—Cleveland, O., Convention and Tire Accessory Exhibition, Auspices National Tire Dealers' Association.
Oct. 24-28—Columbia, S. C., State Fair.
Oct. 27-Nov. 5—Macon, Ga., State Fair.
Oct. 27-Nov. 6—Shreveport, La., State Fair.
Nov. 3-5—Omaha, Neb., International Automobile Congress.
Nov. 4-12—London, England, British Motor Show, Society of Motor Manufacturers and Traders.

Nov. 7-14—Paris, France, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Under Auspices of the Chambre Syndicale Industries Aeronautiques.
Nov. 8—Elkins, W. Va., Semi-Annual Meeting, West Virginia Automobile Dealers' Association.
Nov. 11-19—Little Rock, Ark., Automobile Show, Little Rock Automobile Dealers' Association.
Nov. 12-17—Jacksonville, Fla., State Fair.
Nov. 14-19—Chicago, Ill., Annual Convention and Business Exhibit, Automotive Equipment Association, Coliseum.
Nov. 14-19—Jersey City, N. J., Second Annual Jersey City-Hudson County Automobile Show, Fourth Regiment Armory, Under Auspices of Hudson County Trade Association; Passenger Cars, Trucks and Accessories; Fred W. Payne, Manager, 342 Madison Avenue, New York City.
Nov. 14-19—Washington, D. C., Enclosed Car Week.
Nov. 15-16—New York City, Semi-Annual Convention, National Automobile Chamber of Commerce Factory Service Managers; H. R. Cobleigh, Secretary.
Nov. 15-17—Kansas City, Mo., Second Annual Meeting, American Petroleum Institute.
Nov. 16-17—Indianapolis, Ind., First Annual Convention, Indiana Automotive State Association.
Nov. 18—Detroit, Mich., Meeting, Society of Automotive Engineers.
Nov. 21—Syracuse, N. Y., Meeting to Effect Preliminary Organization of New York State Association of Automobile Dealers.

Nov. 22-24—Chicago, Ill., Chicago Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce.
Nov. 24—Los Angeles, Cal., Speedway Events.
Nov. 26-Dec. 3—Shanghai, China, Automobile Show.
Nov. 27-Dec. 3—New York City, Automobile Salon, Hotel Commodore.
Nov. 28-Dec. 2—Grand Rapids, Mich., Convention, Michigan Implement Dealers' Association.
December—Greenville, S. C., Semi-Annual Meeting, South Carolina Automotive Trade Association.
Dec. 3-14—Brussels, Belgium, 15th Motor Show, Palais du Cinquantenaire.
Dec. 6-9—Sioux Falls, S. D., Annual Convention, South Dakota Implement Dealers' Association; Exhibition of Farm Machinery Held in Connection.
Dec. 13-16—Columbus, O., Fifth Annual Convention and Exhibit, Ohio Automotive Trade Association, Memorial Hall.
Dec. 23—Detroit, Mich., Meeting, Society of Automotive Engineers.
Dec. 27-29—Chicago, Ill., Convention, American Society of Agricultural Engineers, Auditorium Hotel.

1922.

January—Chicago, Ill., Automobile Salon, Drake Hotel.
Jan. 7-13—New York City, National Automobile Show, National Automobile Chamber of Commerce, Madison Square Garden.
Jan. 11-14—New York City, Annual Meeting, Society of Automotive Engineers, Engineering Society Building.

Announcing Two Important Events

Automotive Equipment Association Convenes at Chicago, Nov. 14-19

ENJOYING the prestige of two previous successful annual exhibits, which were in every way representative of and creditable to the mammoth automotive industry of the country, the Automotive Equipment association is confidently predicting that its approaching Third Annual Exhibition and Convention will eclipse all former events in the variety and comprehensiveness of displays and the scope and value of the programme.

THIS event will take place Nov. 14 to 19, and will be staged in the Chicago Coliseum, where the two preceding shows were held.

The Automotive Equipment association has now grown to a nation-wide organization composed of the country's leading jobbers and manufacturers, and this season's sessions will be attended by the big majority of the accessory distributors of America, by the representatives of hundreds of parts and equipment makers, and thousands of dealers and an interested contingent from the general public will be attracted by the big accessory show.

Because the Automotive Equipment association holds the enviable record of having placed the automotive business of the country on a stable foundation, has defined its productive policies and established it among the great industries of a great nation, its proceedings this year, as in the past, will be closely followed by

the myriad of dealers, garage owners and repair men who will be unable to attend personally. At this great convention new standards will be discussed and adopted and new merchandising policies outlined that will mean much to the present and future business of automotive industries.

The advance demand for exhibition space indicates that there will be collected and demonstrated in the Chicago Coliseum in November the most representative display of automotive equipment and accessories ever seen under a single roof at one time. And the programme committee has spared no pains to present features which will not only be of interest, but also of solid benefit to all branches of the industry. And the spirit of co-operation between manufacturer and jobber will be stimulated and the gospel of optimism preached in no uncertain terms.

Manufacturers will have an opportunity, through reports from and association

with jobbers from all sections of the country, to size up the present situation and gauge more accurately the prospective business outlook for the industry. Jobbers and dealers, on the other hand, will be enabled to learn and better appreciate the peculiar and perplexing problems that have been confronting the manufacturer through these strenuous days, and to lend all assistance possible toward their solution.

There is no question but that harmony of interests between the production and distribution ends of the industry is the great desideratum to enable it to make a quick and sure recovery from business depression and reverses, and there would appear to be no better media than are presented by conventions, conferences and other propaganda such as are being disseminated by the Automotive Equipment association and similar organizations.

National Tire Dealers Meet at Cleveland, October 18-20

THE convention of the National Tire Dealers' association, which will be held in Cleveland, O., at the Winton hotel, Oct. 18, 19 and 20, promises to be a memorable event in this branch of the automotive industry from every angle. A programme has been arranged which would seem to leave nothing undone that will in any way increase the comfort and pleasure of the delegates and visitors and, at the same time, much important work has been outlined to be disposed of in the three days allotted for the convention.

The Central Passenger association has approved the association's application for reduced fares for delegates and guests and their families under the usual plan, information in regard to which will be gladly furnished by the officials of the Tire Dealers' association, or at any railroad ticket office in the larger cities.

One of the most important matters of business to be transacted will be the election of officers.

The programme in detail is as follows:

Tuesday, Oct. 18.

8:30 to 10 a. m.—Registration and Assignment.

10 a. m. to 12 m.—Attendance Recorded; Reading of Minutes of Formative Meeting Held in Chicago, Jan. 30 to Feb. 2, 1921; Report of President; Report of Board of Directors; Appointment of Finance, Nominating, Auditing and Resolutions Committees.

12 m. to 2 p. m.—Luncheon.

2 p. m. to 4:30 p. m.—Report of Secretary and Treasurer; Discussion of Finances; Recess.

DELEGATES to this convention of the National Tire Dealers' Association at Cleveland will find, in the attractive programme that has been arranged, plenty of opportunity to benefit by the interchange of ideas and to gain information from experts, as well as relaxation in the way of factory visitations, equipment demonstrations and social events. Come early and stay until the end is the urgent request of the association's committee of arrangements.

Evening—Special Demonstration of Tire Accessories and Devices the Dealer Can Employ in His Business. This Tire and Accessory Show will be open until 11 p. m.

Wednesday, Oct. 19.

The entire day will be spent at Akron

in inspection of the world's largest tire producing plants. It is planned also to send a delegation to Kent, O., to inspect the only fabric mill in the Akron section. These two features will consume the entire second day and should prove very interesting and instructive to every delegate and visitor attending the convention.

Wednesday Evening—The Cleveland branch of the National association has arranged for a programme of stunts in the "Rainbow Room" of the Winton hotel.

Thursday, Oct. 20.

9:30 a. m. to 12 m.—Reports of Committees; Reports of Special Committees; Unfinished Business.

12 m. to 2 p. m.—Luncheon.

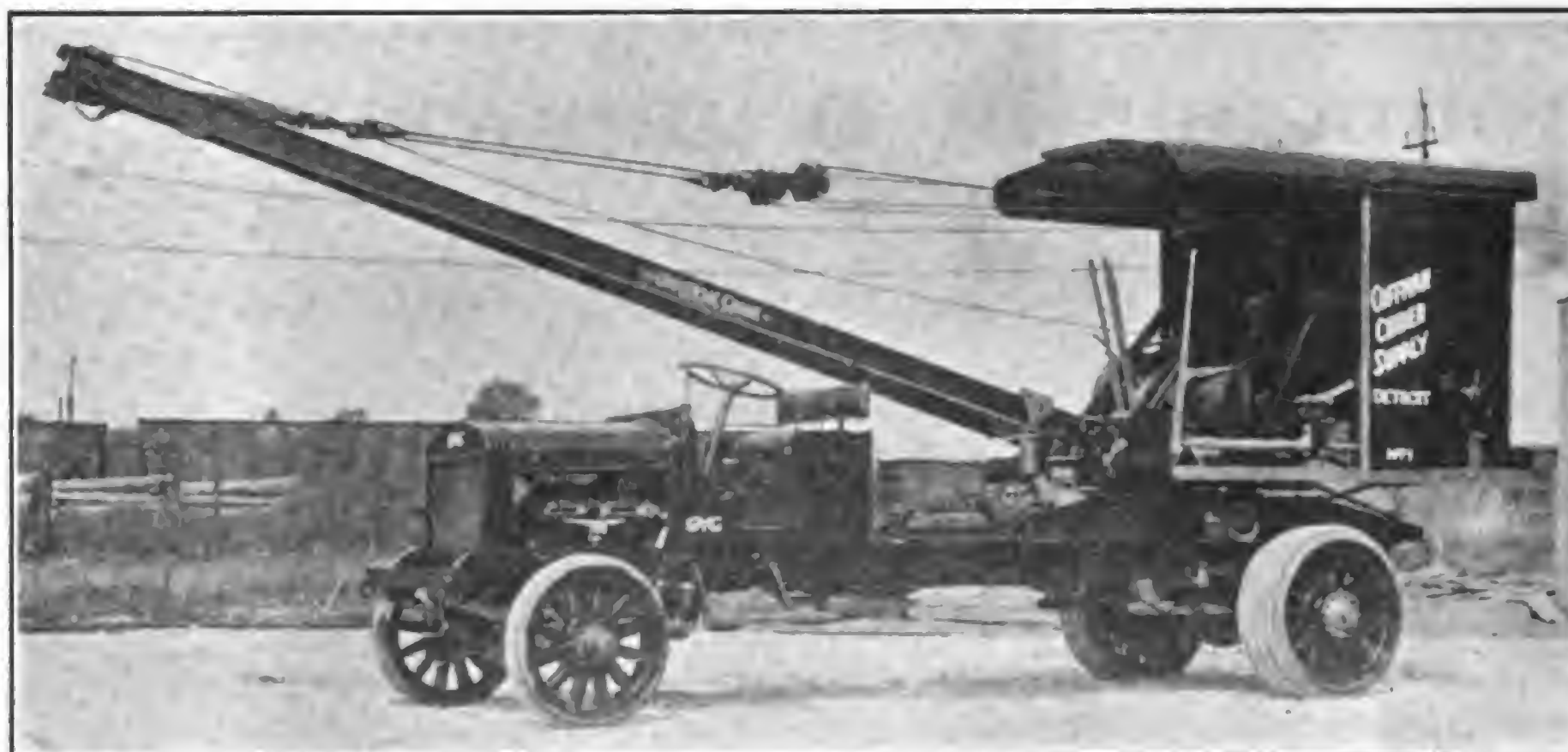
2 to 4:30 p. m.—New Business; Election of Officers; Discussion of Topics; Adjournment.

Evening—This will be the "night of nights," so far as the convention is concerned. A banquet and musical programme has been planned with professional entertainers on hand during the banquet. Following the banquet two speakers of national prominence will give addresses.

Special Events for the Ladies.

In this programme the ladies are not at all overlooked. A special ladies' committee from the Cleveland association will entertain the ladies from out-of-town on sight-seeing trips, matinee parties and concerts.

This Unique Combination of Truck and Crane Is Proving a Boon to General Contractors.



It Can Be Used in a Variety of Ways and Goes from One Job to Another Under Power.

A Real Money Saver

*Universal Crane Mounted on Truck Chassis
Travels at Speed of 12 Miles an Hour—Has
Wide Range of Usefulness.*

CONTRACTORS and others who handle and rehandle large amounts of loose material have, during the last few years, come to depend more and more on power-operated machinery to transport this material in as cheap and economical a manner as possible. This, and the shortage of labor, has caused manufacturers to develop this type of power-operated machinery. Early forms, many of which are still in use, are powered by steam. A steam boiler generates the required steam pressure and a steam engine supplies the power to operate the crane. Machines of this type are seen almost daily in the larger cities wherever construction work on a large scale is being carried on. Digging cellars of large buildings is done expeditiously by this method at a great saving of time and labor, although figures are not available showing the difference in cost as compared with hand labor.

ROAD contractors have used outfits of this type extensively for unloading aggregate from freight cars on sidings to motor trucks, to be transported to the job which they are constructing. Much of this material is transferred to power-operated batch mixers which mix the aggregate and cement in the correct proportions with water added to form concrete and the latter is then transferred in special truck bodies holding one or two-yard mixes to the construction job and dumped in place on the road bed.

Coal is handled on a small scale by this same method, but the high cost of the crane and mounting operated by steam prohibits its general use. As the steam-operated machines are portable and able to make their way from one job to another under their own power and also to work into the excavation, they are able to handle a large amount of work in a day's time.

It has remained for the Universal Crane Co., with general offices in Cleveland, O., and works at Elyria, O., to place on the market a type of crane similar in design to the older types, which may be mounted on practically any five-ton motor truck chassis and be transported from job to job at the governed speed of the truck, which is usually around 12 miles an hour. Power is supplied by either an independent stationary gasoline engine or by electric motor as desired.

The crane is constructed very compact-

PROTECT INNER TUBES FROM RUST.

What's this—a joke? Who ever heard of rubber rusting? Well, of course, it doesn't but it is often injured by rust just the same.

Allowing the rim to become rusty injures the inner tube more than it does the rim itself. Rough particles of rust and scale from the rusty rim shift down into the shoe and act like sandpaper on the tube.

For the sake of the tubes, an occasional coat of aluminum paint should be given the rims when the tires are off. This will prevent rust and greatly prolong the life of the tubes.

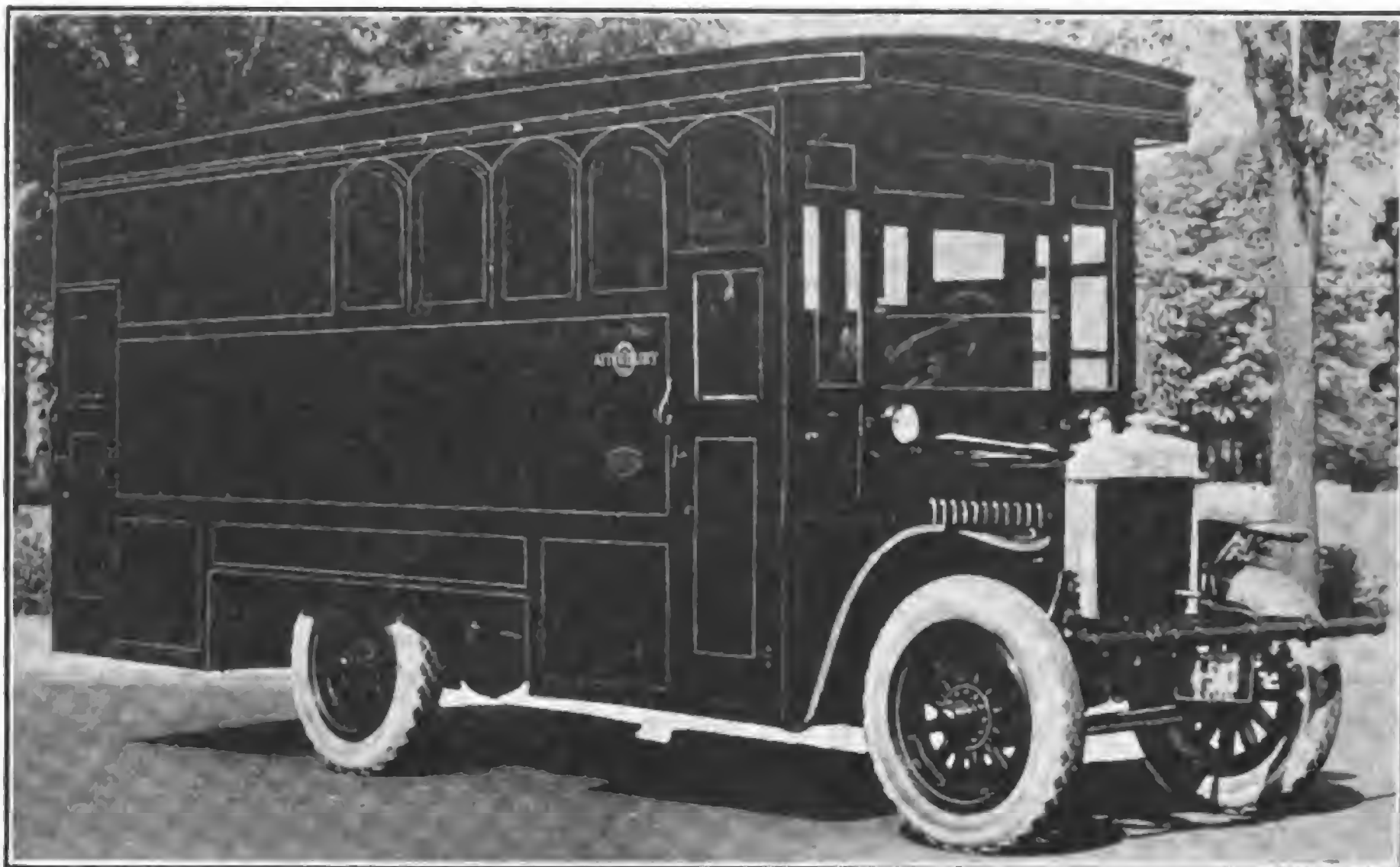
ly and has a rear swinging clearance of only seven feet six inches from the center rotation, so that it may be applied to a large number of five-ton trucks. The ap-

plication to different types of trucks requires certain special details such as bolting the frame to tie the crane on to truck frame and the proper distribution of load, details which are supplied by the company to prevent excessive tipping of the truck frame on the springs when the crane is in operation. These parts consist ordinarily of a jack screw mounted from the crane base in an inverted position which can be screwed down to rest on the truck spring over or very close to the rear axle. A stirrup is also provided on each side of the crane mounting which ties the crane base and frame to the rear axle, preventing up-throw of the springs when the crane is lifting a heavy load. Springs or rubber cushions are usually used on these stirrups so that no adjustment is necessary during travel on the road or when the crane is working.

The jack screws are very easily turned up by hand when a long road trip is necessary, making the preparation of the truck and crane only a matter of a few minutes.

There is a small leg supplied on the boom which is placed in a pocket in the truck frame, when travelling long distances, to support the boom, and the crane is securely locked against any possible rotation during such travel. When the crane is equipped with a grab bucket, a bumper has been arranged on the front end of the truck to support and tie the bucket securely during travel.

Travelling Bungalow Is Completely Equipped



Family of Six Starts on 15,000-Mile Jaunt in Newly Built Cruiser That Has All the Comforts of Home.

THE permanent address of Homer E. Dyke, a Buffalo druggist, will be "North America" when he steps on the starter and casts off for a 15,000-mile tour of the South and West in his Atterbury Cabin Cruiser.

Entirely free from railroad tickets and hotel bills, Mr. Dyke and his family of five are going to "See America First" and do it from the windows of their own travelling home.

Following the ideas of Mr. Dyke, the body was designed to give utmost travelling comfort and convenience with the absolute minimum of equipment and space. From the big pneumatic tires right through to air cushions and mattresses, comfort is always uppermost in mind.

THE outside of the body is finished in dark mahogany with gold striping. Gasoline and water tanks are hidden by panels so that the entire appearance is one of neatness and elegance. Bevelled plate glass windows adjustable to any amount of opening give complete ventilation and vision and at the same time full protection from storms. Compartments for spare tires and baggage are inside so that there is no necessity for strapping spare equipment to the outside.

Inside the walls and ceiling are finished in natural wood with varnished surface. Every piece of equipment has its place and the whole effect is orderly and home-like.

Berths are arranged lengthwise and across the front and the cushions in use during the day are used as comfortable air mattresses at night.

After dark 21-candlepower ceiling lights operating in connection with the Delco electric starting and lighting system provide plenty of light for reading and general comfort.

A complete galley or kitchen at the rear of the body is equipped for cooking real meals throughout the trip. This galley is really a special kitchen cabinet equipped with gasoline stove and running water. The running water is supplied from large tanks by air pressure and is instantly available at a neat porcelain sink. In addition to the regular stove a fireless cooker is carried so that cooking

DRIVER SHOULD KEEP A TIRE LOG.

Do you keep a tire log? It will help a lot when you go to the adjuster with your tale of woe. Use a small note book and give a separate page to each tire. Rule off five vertical columns. Label them as follows: Date put on, speedometer reading, date taken off, speedometer reading, mileage. Make the partial totals in the last column and add any other information necessary, such as kind of weather, etc.

may be done with a minimum of effort and incidentally the least possible amount of fuel.

The perishable food is carried in a built in refrigerator of capacity sufficient for several days running where ice may not be available.

While the body is designed to carry the entire family both day and night, a large tent is stowed under one of the berths.

The tent is so designed that it may be attached to the body, thus giving the tourists the advantages of outdoor sleeping.

Trap doors in the floor and lockers around the sides of the ceiling give ample storage space for supplies and duffle.

The outfit is mounted on a standard 1½-ton Atterbury chassis having a speed of 22 miles an hour and a total weight of 7700 pounds.

Particular attention has been devoted to eliminating noise. The body is rigid and free from squeaks, while the chassis with a latest type Continental motor and Timken worm-drive axle, is remarkably free from vibration and gear noises are entirely lacking.

The combination of large pneumatic tires with long springs, 144-inch wheelbase and comfortable air cushions for seats and backs gives a degree of riding comfort equal to that of the finest type of conventional passenger car.

The owner of this unusual type of motor bungalow has spent much thought in planning it and those who have been so fortunate as to have had the opportunity to inspect it at close range say that it is the epitome of comfort.

Due regard was paid to the principle of spring suspension with relation to the weight of the truck and body and the result obtained has been unusually good, it is said.

Mr. Dyke has no definite plans for his trip, but will go wherever fancy dictates and will probably be away several weeks.

Trolley Bus Is Successful

Detroit Officials Well Pleased with Work Done by Experimental Passenger Carrier Which Authorities Say Forecasts New Transportation Era.

THROUGH the combined efforts of the Detroit City Railway commission, the Packard Motor Car Co. and the Westinghouse Electric & Manufacturing Co., another valuable contribution has been made to the study of passenger bus operation. This new development is an improved, electrically-driven, trackless trolley capable of hauling a minimum of 30 passengers and of attaining a speed of more than 25 miles an hour.

The bus is 24 feet long, eight feet wide and weighs 11,500 pounds, which is considerably less than even the small one-man street cars which are operating in various parts of the country.



This Specially Equipped Packard Omnibus, Which Takes Power Direct from the Electric Car Wires, Made a Good Impression When Tried for the First Time in Detroit.

CURRENT for driving the bus is furnished by a two-wire trolley circuit, through a two-pole trolley, which permits marked freedom in turning to the right and left according to the demands of traffic. Complete turns are made with equal freedom and facility.

Simplicity of control and operation is highly perfected. The application of power and the braking are both accomplished by foot controls, thus leaving the operator's hands free for driving and for opening and closing the door. The bus is made to run at two speeds, the first about 15 miles an hour and the second about 25. The power can be varied quickly and positively through the use of the foot controls.

In the presence of Mayor Couzens and the Detroit City railway commissioners, William B. Mayo, G. O. Ellis and a crowd of residents numbering well over a thousand, the new Packard trolley made its first trial on the morning of Aug. 23, at a location on the Harper avenue street railway line, where the special two-wire overhead had been installed.

The results of the test, insofar as they will influence the actual placing of orders for bus equipment of this type, have not yet been commented upon definitely by Detroit city officials. Mayor Couzens,

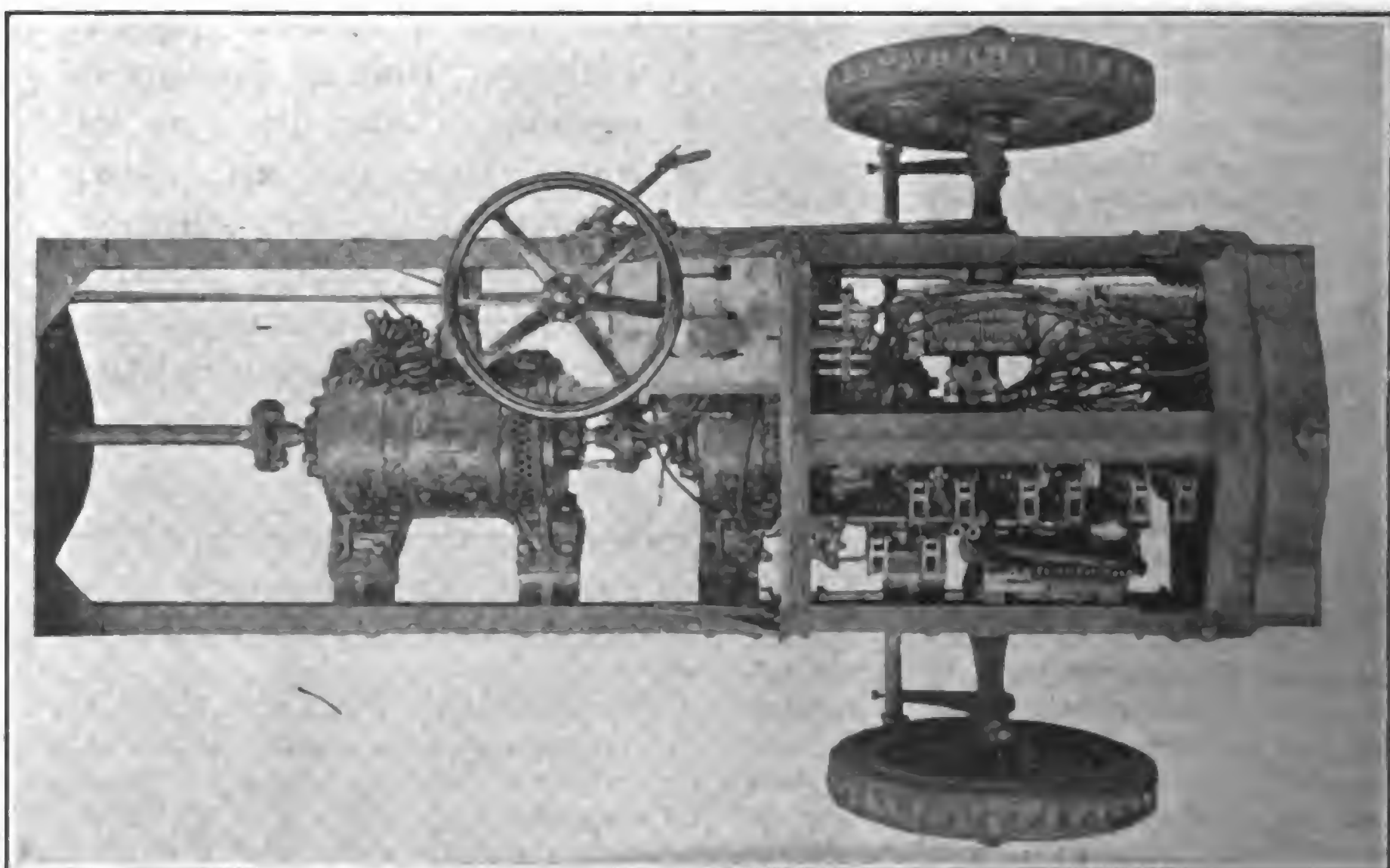
however, has said, "I do not wish to appear definitely committed to this type of car, but from what I have seen this morning I believe it can be used very successfully in conjunction with our municipal

lines and, with time, developed to give adequate service in the down-town districts."

The demonstration which has been given is the result of considerable thought on the part of Mayor Couzens, the Detroit City railway commission, and Joseph S. Goodwin, general manager of the Detroit municipal lines. It represents, moreover, a period of highly intensified development work at the hands of the Packard Motor Car Co. and the Westinghouse Electric & Manufacturing Co.

As a mechanical unit the new trolley is an ingenious combination of a Packard truck chassis with an electrically-driven power plant. The motive power is furnished by two 25-horsepower, 37-ampere, 600-volt motors, mounted in tandem by means of a universal joint, and connected by means of a second universal joint to the standard type truck differential drive in the rear axle. The motors are of the standard safety car type, with their shafts extended at both ends so that the universal joints may be readily attached. Both of the motors are interchangeable and are protected against thrust from the driving mechanism.

Collection of the current is effected by the use of two No. 13 U. S. trolley bases, fitted with 18-foot poles and swivel harps.



Cut Shows Position of Motor and Control Units, Which Latter Are Located in Space Usually Occupied by Engine.

Saves Excavating Costs

***New Rubber-Tired Steam Shovel Perfected—
Saves Time and Money for Contractors as It Is
Easily Moved from One Job to Another***

THAT the steam shovel, the ubiquitous piece of apparatus which has been so much used by contractors in road construction and building operations, could be so adapted as to be transported over city streets and hard-surfaced highways without doing damage to the surface has long been desired. The slow speed of the steam shovel when travelling from job to job has been another problem that contractors and others have often wished could in some manner be solved.

There is probably no piece of machinery that is depended on so generally to keep down excavating costs as is the steam shovel. They may be found digging cellars for new constructions, excavating for road building operations, digging ditches and performing work in an incredibly short time which formerly was performed by hand. Both time and labor are saved by its use and in these times of high prices for all classes of construction work the steam shovel has done much to solve the labor problem.

TRANSPORTING the shovel over city streets and highways offers a problem which has long puzzled owners of these machines. Towing has been possible, not often resorted to because of the extreme weight of the machine, and again no method was devised in the earlier types for disengaging the power drive mechanism from the rear axle. The drag of the drive made towing a difficult matter, preventing transportation except by the slow method of driving the shovel under its own steam power, which is usually about 2½ to 3½ miles an hour. **Use of Rubber-Tired Wheels Solves Difficulties.**

The Osgood Co., Marion, O., is now offering to contractors and others who may be interested, a steam-operated shovel mounted on rubber-tired wheels for road haulage or road operation. The rubber tires, together with the steel bands, are removed when it is desired to use wheels with steel rims and cleats. The rubber tires and steel bands are of the pressed-on type and are quickly removed or replaced.



Showing Manner by Which Shovel Is Used to Load Motor Trucks—Rubber-Tired Wheels May Be Changed for Steel Rims and Cleats if Desired.

Cast steel wheels are used with spokes cast integral, providing unusual strength, while the tires are of Firestone make, 40 inches in diameter and 14 inches wide, consisting of solid rubber, ribbed tread.

A firm foundation is provided for the operation of the shovel, the axles being unusually long and the rims of the wheels

or rubber tires offering a broad holding surface.

The new shovel is called No. 18, has a three-quarter yard capacity and is known as a traction revolving steam shovel. This shovel should prove of exceptional interest to road contractors, building contractors and others who use this type of machine, as it offers a solution of the many problems presented in the operation of steam shovels both on the road and in the pit.

Special provision is made for disengaging the travelling gears for towing with motor truck or tractor and a towing bar is regularly attached to the shovel, making towing by motor truck an easy matter.

COMMUTATOR TRUEING LATHE.

The Central Manufacturing Co., Fairfield, Ia., is placing on the market a new device which may be used for armature testing, turning commutators and similar work. The device consists of a small bench machine fitted with speed head, tool block and carrier and will be found very useful in the general run of motor and generator repairs.

A cast base fitted with four legs raises the device from the bench while two speed pulleys allow for two different speeds on the speed head.



Rubber Tires Make It Easy for Contractor to Enlarge Field of Operations as Machine Tows Very Easily.

Join The Silent Gear Shift Club

Only Requirements for Membership Are Willingness to Learn Clutch Construction and Exercise of Reasonable Care in Driving—Benefits Derived Are Many.

THE truck driver who really prides himself on his knowledge of motor truck mechanics realizes that one of the first things he should learn is to shift his gears as quietly as possible. This is an art which is easily acquired and adds much to the comfort of the driver and the life of the truck.

In early types of trucks the necessary attention was not given to this detail, but in later models the manufacturers have so designed the clutch and transmission gear shift, that with slight practise this loud clashing of gears and grinding noise has been nearly eliminated. It is the man who has recently purchased his first truck who is usually found to be the offender in this matter. The manufacturer is interested in eliminating any factor in motoring which is destined to take the joy out of life at the steering wheel. Certain makes of automobiles have fewer problems along this line, though the manufacturers of motor trucks have done much to lessen the trouble with gears. The three-speed sliding gear transmission seems to be the most satisfactory, considered from all standpoints, including cost of manufacture, ease of repair and care required.

The Quiet Driver Demands Respect.

The driver should learn at once how to manipulate the gear shift lever with as little noise as possible. This can be accomplished in a very short time by assiduous practise in shifting gears. In taking a demonstration of a new truck, you will nearly always note that the demonstrator is an expert in handling that particular make of truck, and as he drives from the curb the gear shifts are made without effort and without sound, and before you are aware of it the machine is in high speed. Jerking of the vehicle is avoided and all noise of gear shifting is eliminated. This is part of the technique of the experienced salesman and demonstrator and he would not amount to much as an employee if he were not expert in

driving. When a man gets into a strange machine he can hardly be expected to shift gears noiselessly under all conditions. It takes a little time to become adjusted to the working and feel of it. But the man who owns and drives his own truck should take pains at the first opportunity to learn quickly all about the peculiarities of that vehicle and be able to make the required gear shifts with ease and confidence.

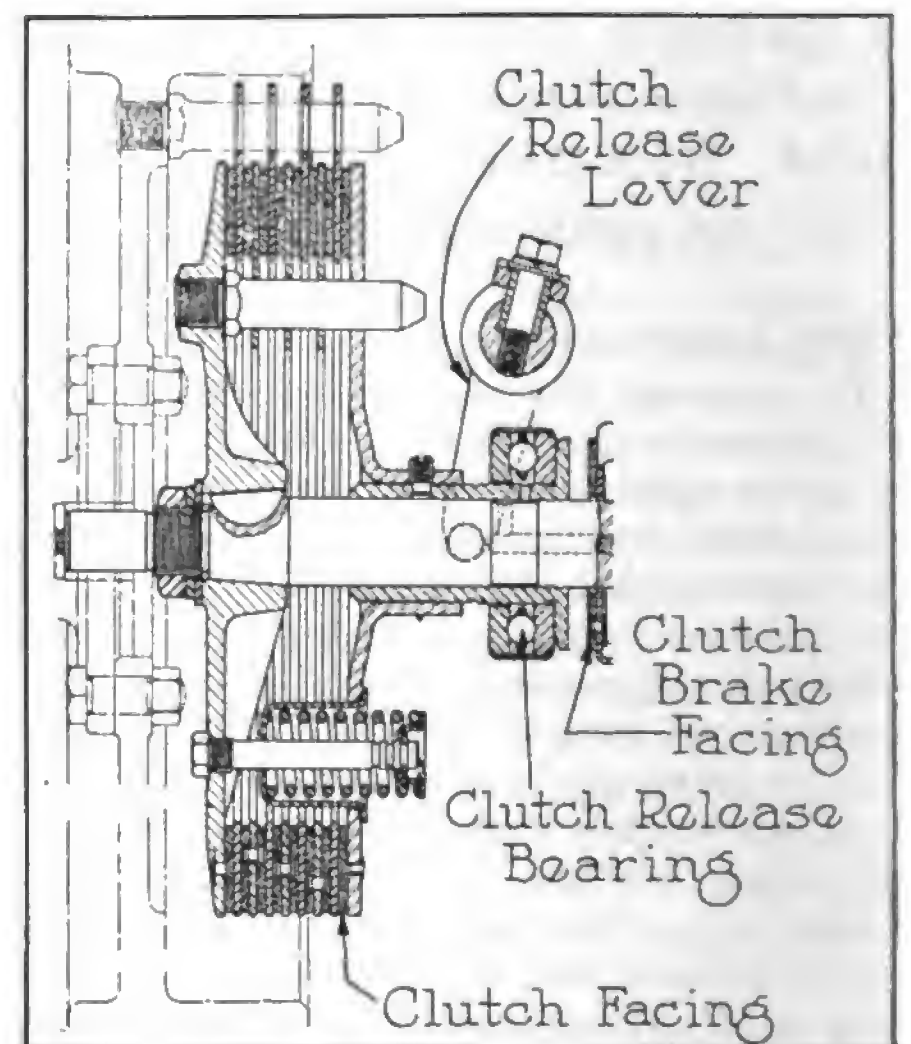
Shifting gears at the proper time and in the proper manner saves racking the entire mechanism of the truck. In the average machine it is not difficult to shift from a lower to a higher gear, although some drivers manage to make a big racket in doing it. One of the sources of trouble in respect to this is a dragging clutch. To eliminate this many manufacturers of commercial vehicles use a clutch brake which comes into action when the clutch pedal is depressed all the way, stopping the clutch from spinning and allowing the gears to mesh without grinding.

How to Obtain Best Results.

On the average car the best result can be obtained in shifting from first to second gear by speeding the car a little on first, shifting out of first, hesitating an instant in neutral and then shifting into second. From second to third speed the lever does not pass through neutral so all that is necessary is to slide the lever from second to high with the clutch pedal depressed. Unless the clutch brake action is harsh the clutch pedal should be depressed all the way in making the shift. On cars that combine the service brake pedal and clutch in one pedal a dry-disc type of multiple-plate clutch is used so that in separating the plates the clutch comes to a stop without dragging, making gear shifting an easy and simple matter. A clutch brake is not necessary with this type as the gears are shifted noiselessly, and without grinding.

Care should be exercised, however, not to speed the car too high before shifting, and the throttle should be in the closed position and the accelerator pedal released during the time of the shift.

Changing from a higher to a lower gear is where much of the humiliation is experienced. This is usually due to the



Multiple Dry-Disc Clutch Unit Assembled, Showing Clutch Brake and Method of Transmitting Engine Power.

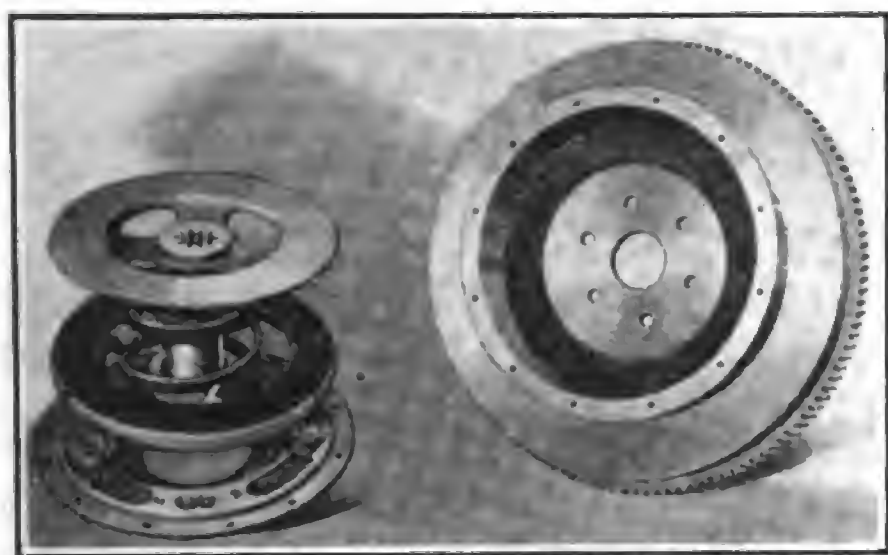
fact that the car is being driven at perhaps 15 or 30 miles an hour, and the driver thinks, for some reason or other, that he is going to have use, say, for the second speed. Immediately he begins to shift, the inhabitants for miles around know what has happened by the resulting noise. Usually no difficulty will be experienced if the car speed is sufficiently diminished. As a general rule when shifting to a lower gear the speed of the car should be a little less than when shifting to a higher, between the same relative gears. This requires some practise.



Multiple Dry-Disc Clutch Disassembled, Illustrating the Parts Which Form the Complete Unit—Alternate Discs, Frictioned Faced on Both Sides and Assembled as Shown with Steel Discs Between—Clutch Spring at Extreme Left Forces Plates Together, Clutch Spring Plate in Center Applying the Pressure—Drum at Right Transmits Power of Driving Plates to Driven Plates, to Transmission Gear Set.

Change Not Often Necessary.

In ordinary driving it is usually unnecessary to shift the gear to first speed except when the car is brought to a com-



Single-Plate Dry-Disc Clutch Unit Disassembled Showing Relationship of Parts Forming Unit Including Springs.

plete standstill. On a fairly level road the second speed gear need not be employed until a speed as low as five or 10 miles an hour has been reached. The gear should only be shifted when the truck speed has been decreased to this extent, and the driver should guard against shifting before slowing down, simply because his judgment tells him he is going to have to use a lower gear, if he desires to make a silent shift.

Motor trucks are often operated over the highways heavily overloaded, and this offers problems very different from those found in light passenger car practice; so much so in fact that the operator has to accustom himself to an entirely different manner of driving and gear shifting.

The components of the clutch are of similar construction to those found in passenger vehicles, but are made stronger and of heavier material to withstand the hard work encountered. The multiple, dry-disc type of clutch is used largely in the smaller sizes, while the heavier capacity trucks are equipped with what is commonly known as the single, dry-plate clutch, such as is made by the Borg & Beck Manufacturing Co. This clutch is constructed in a simple manner, is very easy to adjust and is free from many of the faults of the cone and multiple-disc types. Engagement of the frictioned surfaces is smooth, avoiding jerking of the vehicle when starting under load and is very sensitive to the action of the foot pedal when shifting gears or disconnecting the engine.

This type of clutch has practically taken the place of other types in heavy vehicle service and is proving very popular with users, on account of its accessibility and trouble-free features.

The modern motor truck is so designed that it will perform practically all of its work on the high gear, even when under load. Exceptions to this are when the vehicle encounters a hill, or when getting under headway, or when soft spots in the road are encountered.

The experienced motor truck driver has learned from past driving experiences that he gets the best results by anticipating road condition before he comes to them, and shifts to a lower gear before entering the difficult portion of the road. By doing this he does not lose the speed of his truck, and possibilities of stalling the engine are prevented. Considering

the loaded, often overloaded truck, in motion, the momentum is frequently sufficient to carry it through slight road difficulties, but when the trouble is of long duration, or the road is in poor condition or there is a long, stiff grade ahead, the truck driver needs all the power that his engine is capable of developing, as well as the momentum of his truck to carry him through.

When climbing stiff grades another factor enters and momentum is lost. The engine is then required to not only pull the truck up the grade, but has also to overcome the tendency of the truck and its load to hug the ground, due to the action of the center of gravity. An old law of motion in referring to this subject has this to say: "A body in motion moves with a uniform velocity in a given direction, unless acted upon by some external force." Gravity in this instance is the external force which constantly interferes with the forward movement of the loaded truck. When ascending a hill the action of gravity tends to pull backward and acts on the truck as a drag. To overcome this drag or additional load the driver has to shift back into a lower speed, and his engine necessarily gives additional horsepower according to the gear ratio in use.

Quiet gear shifting under the conditions, especially if tried on a stiff grade, is often an impossibility unless done very quickly or the truck is brought to a stop and held with the brakes. The first speed is then used in starting and as it is very low on heavy trucks the power of the engine is greatly multiplied and turns over very rapidly. To shift to the next higher speed is where the difficulty often comes in. The truck must be kept in motion and the gears shifted without stopping the truck and without racing the engine, otherwise the neighbors for miles around know what is happening.

It is bad practice to get on to a steep grade with a loaded truck and then try to shift gears. This should be done at the bottom of the grade while the truck is still under momentum and the correct gear chosen which will carry the truck to the top without straining the engine. Good judgment in choosing the gear will do much towards saving the engine or overworking it and will mean added life to the power plant.

At this point the experienced driver enters, and he can do much to increase the life of his truck and its units by handling the power plant with good judgment.

Clutches of the single-plate and multiple-plate type will stand a lot of abuse before giving trouble. Probably the one item that can put them out of use the quickest is riding the clutch pedal with the foot. Unconsciously the driver allows his foot to rest on the clutch pedal, the weight of the foot and leg exerting a slight pressure which, together with the nervousness of the driver, is often greater than he figures. Slipping of the plates of the clutch results slight at first, gradually increasing as wear takes place, till eventually the clutch discs slip, allowing the engine to race ahead of the car when grades are encountered, and when the engine is accelerated to pass another vehicle on the level road. Heating is liable to result and burning of the frictioned

surface, necessitating its renewal if the practice is persisted in.

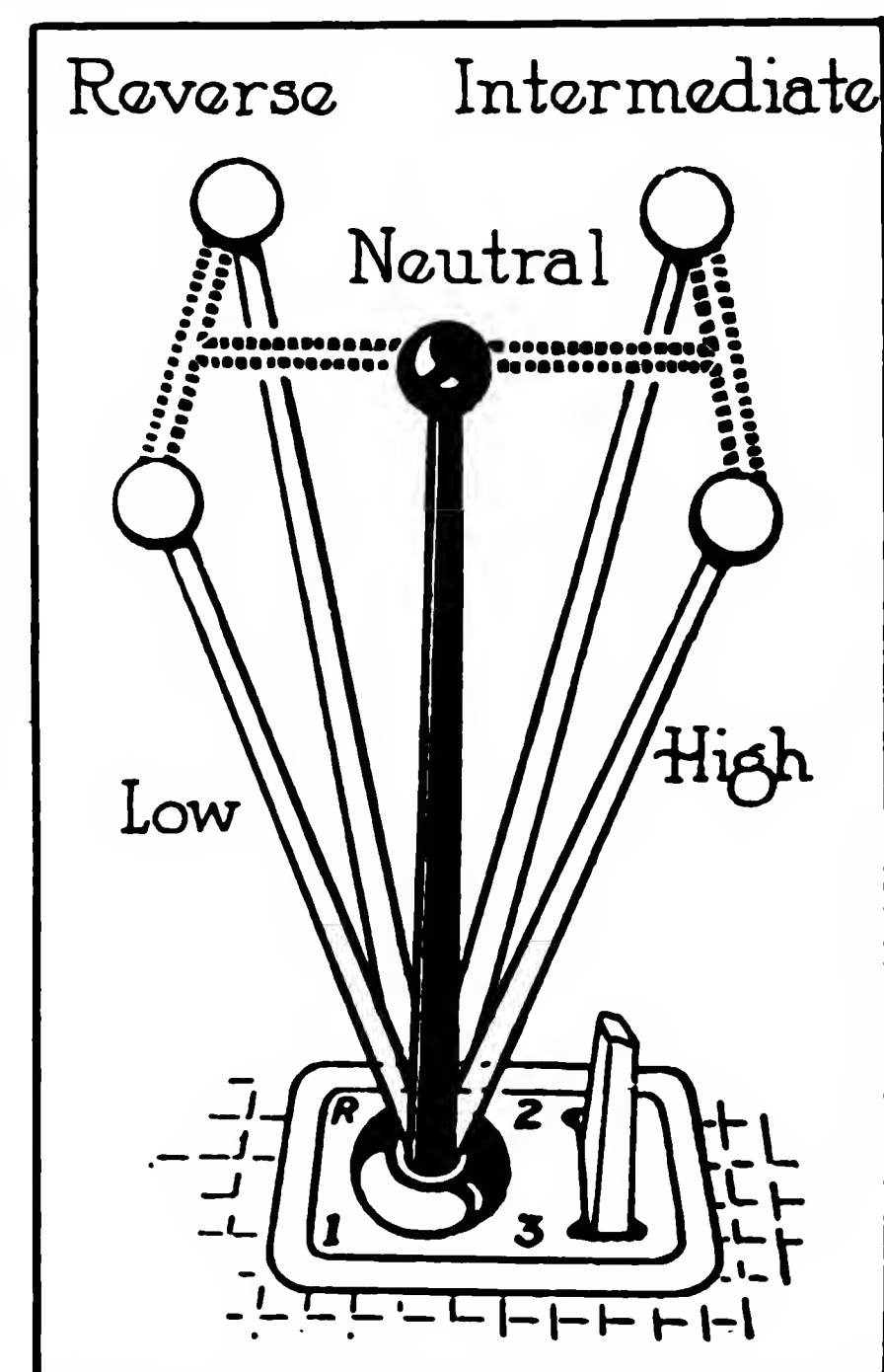
Experienced drivers do not allow the foot to rest on the clutch pedal any longer than is necessary. The clutch is allowed to perform its work and wear between the frictioned surfaces is reduced to only what is necessary for gear shifting and driving in traffic.

Experienced motor truck operators have learned that best results are obtained when travelling down grade by leaving the clutch in, using the compression of the engine as a brake to retard the momentum of the truck and prevent it travelling too fast. This method of driving down grade not only saves the clutch from unnecessary wear, but also reduces the possibility of accident which might occur if the loaded truck were allowed to coast with the clutch held out or released from the engine. Releasing the clutch on long, steep grades is a very dangerous practice, as the driver is then forced to depend on the brakes to check the speed, and if by chance they should burn out, as they often do when this practice is followed, the truck is left without means of checking the momentum and a bad accident is almost sure to follow.

The driver should make use of the engine compression whenever possible and save the brake linings for future needs of less exacting nature. The cost of relining brakes is high and the truck must be laid up while the work is being done, necessitating delay, which is also costly.

Use may also be made of lower speeds if the grade is especially steep, the change being made at the top before the truck starts on the down grade.

To belong to the Silent Shift club is to have become established in the automotive world as an efficient driver. The membership in this club is not overcrowded and it would be a good thing if all drivers would seek to qualify for admission into its sacred precincts.

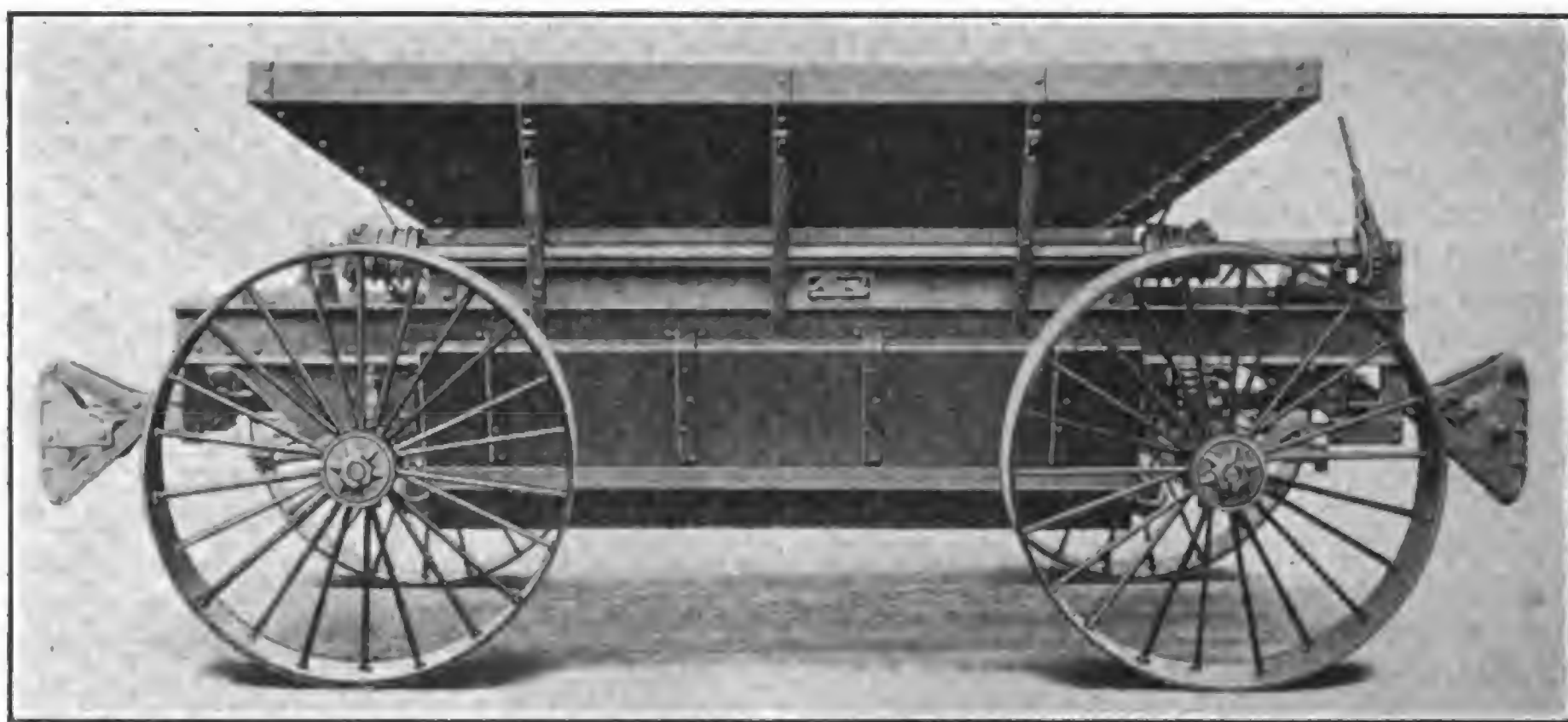


Positions of Gear Shift Lever When Shifting from Neutral to Low, Low to Second, Second to High or Neutral to Reverse.

Increases Truck Efficiency

Miami Slow-Speed Trailer Saves Time and Money for Vehicle Owner—Has Several Unique Features That Recommend It to Big Fleet Operators.

THE Miami Slow-Speed trailer, manufactured by the Miami Trailer Co., Troy, Miami County, O., embodies several unique features which especially recommend it for general purpose trailer service, and they may be used in trains with either a tractor or motor truck, depending upon the power of the hauling vehicle. The trailer is reversible, allowing the tractor or truck to be hitched at either end, and is designed to be used in trains of from four to eight, the number of units in the train depending upon the road conditions, grades encountered and the draw bar pull of the tractor or truck employed. It is, of course, necessary to reverse the method of locking the draw bar when the train is reversed.



This Trailer Is Designed to Be Used in Trains Made Up of Several Units—It Is Easily Loaded and May Be Attached at Either End.

THE rear wheels, or the pair of wheels on each unit farthest from the tractor, are locked in the central position, the front pair of wheels and draw bar being free to swing from side to side to guide the unit.

Slow Speed Trailers in Commercial Haulage.

In backing the train this method of locking draw bars is reversed. The locking device is positive and quickly operated; merely the dropping of the locking pin through the slots provided in the draw bar and draw bar rests. This locking device is provided with three slots, the central slot being used regularly. By moving this locking pin from the central slot to the slot on either side, the train can be staggered so that the wheels of the next trailer will not follow in the tracks of the preceding trailer.

Draw Bar All-Steel Construction.

The draw bar is of all-steel construction fitted with a cast steel draw head, amply reinforced. The draw bar pin is centered 24 inches from the ground, this being an ideal height for the tractor hitch connection as the connection hitch at the trailer end is lower than at the tractor end, making an upward pull on the front end of the first trailer and a downward pull on the tractor, giving the tractor its full traction effort. The draw bar is built up of channel steel, reinforced where the greatest strain comes. A hinged link connection is provided for use between two trailers, this hinged link folding back

within the draw heads, permitting them to come in contact when the train is backed. This method provides an ample rigid connection for backing the entire train.

Axle Construction.

The center section of the axle is a five-inch I-beam, 14¾ pounds to the foot, to the ends of which are hot-riveted cast-steel yoke arms which are connected to the spindle by a hardened and ground bolt, 1¼ inches in diameter, lubricated through the Alemite high-pressure system.

The wheels are all-steel construction, 44 inches high, fitted with 10 by ½-inch tires and ¾-inch round spokes. The wheel hub is machined to close limits to take the pressed fit of the outer races of the bearings, one to each end of the hub. With this construction these races can be quickly and easily replaced at minimum cost. The spoke ends are all countersunk in the tire rim, leaving a perfectly flat surface.

Two heavy-duty Hyatt roller bearings are placed on each spindle with inner and outer races. These races are hardened and ground, the spindles being made in steel castings machined to close limits to take the inner races. The entire bearing equipment of each wheel revolves in a heavy grease bath, replenished through the Alemite high-pressure system. With this type of construction it is unnecessary to remove the wheels from the spindles.

All models of the Miami slow-speed

trailer are constructed with an all-steel chassis frame which has six-inch channel side and end members reinforced with corner irons set at an angle to give added strength and hot rivetted. Two heavy coil springs are mounted under one end of the trailer, permitting a rock of the frame and body of approximately three inches, taking up all the torsional strains which occur in a heavy-duty unit of this nature constructed without load-carrying springs.

Description of Body MR-3 Bottom-Dump

The Miami trailer may be regularly equipped with either a platform type body fitted with stakes or a special bottom-dumping type known as Model MR-3. This hopper type of body is constructed from 3/16-inch steel plates reinforced with angle ribbing and corner irons, all hot rivetted. This type of construction has been found to be the most durable under all conditions, the angles and smooth surface assuring the quick movement of the load as the dumping-bottom doors are released.

The loading height of this model is but 60 inches from the grade. It has been determined that this height is ideal for heavy-duty service and that a level load of three yards is maintained, which can be increased to four, if the load is heaped. This loading height is absolutely essential if the trailers are operated in connection with elevating graders or in steam shovel work. It is also very convenient when operating under standard loading bins. This very important feature has been incorporated without sacrificing wheelbase, flexibility or capacity of the unit. A very low center of gravity is also maintained as the top of the body is but 16 inches higher than the top of the wheel, making it practically impossible to upset the unit.

The bottom doors are constructed of No. 10 gauge steel reinforced lengthwise with two by two by ¾-inch angle irons. These doors are mounted by bolts on the outside of the steel channel side members, permitting a bottom opening of 38 by 73 inches, which assures instant dumping of all kinds of material as the dumping mechanism is released. The two doors are held in a closed position by two separate chains winding on drums mounted

(Continued on Opposite Page.)

Aids Trolley Service

Standard Motor Truck Co. Has Perfected Collapsible Tower Equipment Operated from Truck Engine or by Hand—Much Used by Traction Companies.

STREET railway repair departments have, from time to time, employed motor trucks equipped with stationary or collapsible towers for use in repairing the overhead wiring systems of their trolley lines. Often these have been constructed in the trolley repair shop out of whatever material was at hand and the results, while not of the best, showed the possibilities of such equipment as an auxiliary to a tower car or horse-drawn equipment, the main feature of superiority lying in the greater speed of such apparatus.

The chief use of the elevated trolley tower truck is for emergency service. A trolley wire breaks in the system during rush hours and it is necessary to repair it as soon as possible to keep the cars in operation.

THE efficient and dependable motor truck with its elevated tower, supplies and tools, quickly makes its way by shortest route to the location in which break has occurred and the crew,

type ever constructed and differs from former towers in that the telescoping principle is used to nest the sections of the tower, one in the other, so that when telescoped the apparatus occupies very little space over and above that of a loaded truck. This feature is desirable when passing under low railway bridges.

The outfit is made by the Standard Motor Truck Co., Detroit, Mich., and claim is made that the tower can be elevated or lowered in less than a minute by moving a lever which is within reach of the driver's seat.

The three-section Trenton tower is located between the cab and body. The Woods hydraulic hoist which operates the tower is located on two cross members in the center of the tower. The hydraulic hoist is hooked up with the hand hoist arrangement so that in case of emergency or when the engine is not running, the tower can be raised easily by one man turning a crank. The tower lowers by gravity and the hand arrangement is fitted with a brake to control the downward speed.

The enclosed cab is fitted with sliding doors and is equipped with an auxiliary roof to allow the workmen to walk over it. A ladder, shaped to the contour of the cab side, is attached to provide means of getting on the tower platform.

Four longitudinal tool boxes form the body equipment. The two inside tool boxes are the full length of the body and the two outside boxes, which are longer, straddle the tower frame. Six double "S" hooks attached to the body posts provide means for hanging on coils or rope, wire, etc. The inside tool boxes are used as seats for the workmen, while the passageway between the boxes has provision made for removable partitions, to make four extra large compartments.

Slanting covers on the two outside boxes protect the contents from the ele-

ments in wet weather and a stop and hand rail, at the rear end of the body, make it easy for workmen to get tools and material from the inside tool boxes and compartments.

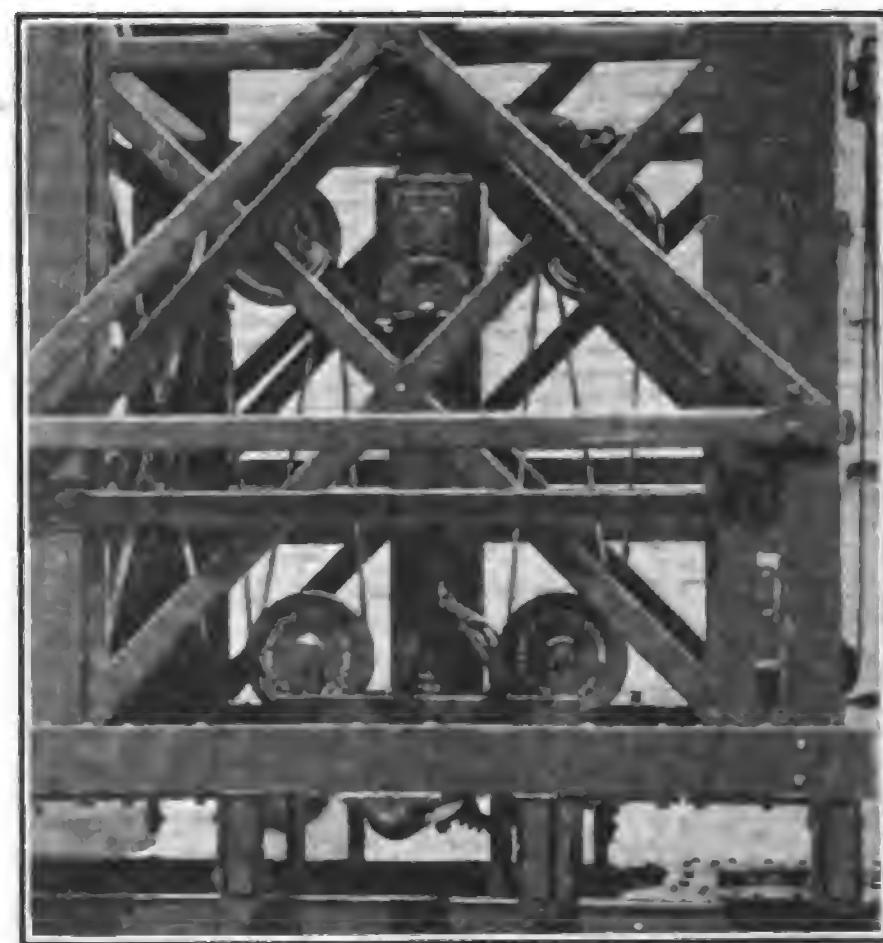


Showing Method by Which Extension Is Used in Repairing Overhead Wires.

having the necessary tools and supplies at hand, can quickly repair the break and have the cars operating again.

Hand methods have previously been used to raise the heavy tower to such a height that the repairers can reach the wires. While this method answered the purpose, much valuable time was lost in getting at the break and fixing it.

Elevated towers for trolley wire service are now being made which can be elevated by either hand or hydraulic hoist. Such a tower is shown in the illustration and is mounted on a Standard 2½-ton motor truck chassis, now being used by the city of Detroit Street Railway Co. It is claimed to be the first tower of this



This Picture Gives a Close-Up of Mechanism Used to Operate Tower.

The body can be completely enclosed in wet weather with drop curtains that are rolled up and attached to the top of the body. The chassis is equipped with a pinle hook and both front and rear tow hooks.

The electric lighting equipment consists of two head lights, one tail light, two dash lights, one spot light and a search light. The search light is mounted on the top of the cab and is so arranged that it can be swung in any direction to illuminate the work while repairs are under way.

The total height from the ground to the tower platform when elevated is 19 feet six inches; when lowered it is 10 feet four inches.

(Continued from Preceding Page.)
ed on a shaft at the side of the body. This method of construction obviates the sag of the doors at either end.

The capacity of the Model MR-3 bottom-dump trailer, level full, is three cubic yards and, by reason of the flared sides and ends, this load can be increased to four cubic yards, if the center of the load

is heaped approximately 10 to 12 inches. The capacity of the unit is five tons, provided with ample factors of safety.

Flexibility.

This very important feature is amply assured in this unit by a short wheelbase of seven feet, five inches, and the further fact that the trailer is reversible, either end being used for the front. Extremely

short turns may also be made by operating both draw bars and both pairs of wheels. Provision is made with this model so that, by the removal of 24 bolts, the bottom dump doors, the hopper type body, the dumping and winding mechanism, are removable, leaving an all-steel chassis frame upon which can be mounted any type of platform body desired.

PERTINENT POINTED

A REAL MARKET.

CONSIDER these figures recently compiled by the Department of Commerce. Read them carefully for they prove without question that the greatest potential market for motor trucks, automobiles and tractors lies in the agricultural districts of America. This vast field if properly worked should yield wonderful returns, and the possibilities are such as to cause the layman who studies these statistics to wonder why this immense territory has not been more intensively worked by the dealers.

Automobiles:

Farms reporting	1,979,564
Per cent. of all farms..	30.7
Number of automobiles...	2,146,512
Number per 1000 farms	332.9

Motor trucks:

Farms reporting.....	131,551
Per cent. of all farms...	2.0
Number of motor trucks..	139,169
Number per 1000 farms	21.6

Tractors:

Farms reporting	229,334
Per cent. of all farms..	3.6
Number of tractors.....	246,139
Number per 1000 farms	38.2

Telephones:

Farms reporting	2,508,002
Per cent. of all farms...	38.9

Water piped into house:

Farms reporting	644,088
Per cent. of all farms...	10.0

Gas or electric light:

Farms reporting	452,809
Per cent. of all farms..	7.0

The number of farms which had automobiles on Jan. 1, 1920, according to the 14th census, was 1,979,564, or 30.7 per cent. of all farms in the United States. These farms reported a total of 2,146,512 automobiles on the census date.

Automobiles were reported by more than one-half of the farms in eight states, namely, Nebraska, Iowa, South Dakota, Kansas, Minnesota, North Dakota, California and Illinois.

The following states reported more than 100,000 automobiles on farms in 1920: Iowa, 177,558; Illinois, 139,090; Ohio, 128,384; Kansas, 111,055; Minnesota, 107,824; Texas, 105,292; Nebraska, 104,453, and Indiana, 102,122.

Motor trucks were reported on 131,551 farms in 1920, or about two farms out of every 100 in the United States as a whole. The number of motor trucks on these farms was 139,169.

The states leading in number of motor trucks on farms were: Pennsylvania, with 9372; New York, with 9259; Iowa, with 8910; Ohio, with 7319; Nebraska, with 6548; California, with 6416, and Illinois with 6154.

Three and six-tenths per cent. of the farms in the United States were reported as having tractors on Jan. 1, 1920. This is about one farm out of every 28. The 229,334 farms thus represented reported a total of 246,139 tractors.

The states reporting the largest numbers of tractors on farms in 1920 were as follows: Illinois, 23,102; Iowa, 20,270; Kansas, 17,177; Minnesota, 15,503; California, 13,852; North Dakota, 13,006; South Dakota, 12,939, and Nebraska, 11,106. These eight states reported more than one-half of all tractors on farms in the United States. For the country as a whole there were 38.2 tractors for every 1000 farms in 1920, and for the eight states above mentioned, taken together, 106.8 tractors for every 1000 farms.

The states with the highest percentages of all farms reporting tractors in 1920 were as follows: South Dakota, 16.3 per cent.; North Dakota, 15.2 per cent.; Montana, 12 per cent.; California, 10.3 per cent.; Kansas, 9.8 per cent.; Illinois, 9.3 per cent., and Iowa, 9.1 per cent.

The foregoing shows that 98 per cent. of all the farms are getting along without motor trucks, since only one farm out of every 50 owns a commercial vehicle.

Certainly there must be a market for at least 1,000,000 of these machines among the farmers of this country. The obvious opportunity is such as to warrant the careful study and attention of every truck dealer in the entire United States of America. What part of this great territory do you choose as yours?

COMMENT OF THE DAY

TEACHERS, TRUANTS AND TRUCKS.

CURFEW still may "ring tonight" in rural New Jersey, but apparently the clang of the school bell is silenced for all time, having given way to the more strident note of the motor horn. Thus passes another American custom—all because the local boards of education have decided that the school children shall be carried to and from school in motor trucks. The edict has also gone forth that these busses shall be driven by the school teachers, who will receive an addition to their salaries at the rate of 60 cents for every hour they are employed as chauffeurs.

No more will Johnny climb into his seat a few minutes after the "last bell" has rung, pleading anything but the true reason to account for his stopping to investigate the contents of a bird's nest. Neither will he laboriously fashion his own excuse, duly signed with his mother's name, to explain the truancy that took him swimming. Teacher will be right on the job each morning and the delinquent pupil will have to climb aboard or tell the reason why. Viewed in the softening light of a somewhat distant childhood it seems almost sad to contemplate the passing of the mellow voiced school bell in the country districts—but the small boy who gets out of walking three or four miles a day will probably view the matter in a more philosophic manner.

PRIMITIVE LEGISLATION.

KANSAS, home of interesting laws and well-known persons, has the distinction of having been one of the first states in the Union to pass a law regulating the use of motor vehicles. This enactment provides that each machine must be equipped "with not less than 10 nor more than 20 trailing ropes to at all times drag behind the car when it is in motion," the purpose of this novel and unusual equipment being to aid the "mangled and bleeding pedestrians" who might chance to encounter one of the "juggernauts" with dire results.

From a cursory and somewhat indolent perusal of this certainly unique law one inclines to believe that it must have been fathered by a Cape

Horn sailor who had in mind the possible advantages that might be derived from such a contraption if hitched to the stern of a schooner, but the manner in which it might have been used by a "bleeding" Kansan is somewhat obscure at the present writing. Fortunately there are no such retarding precepts laid down for the motorist in this more enlightened age of the world, and one is naturally a bit indulgent when thinking of the unusual legislation of a darker era—since this law was enacted nearly 18 years ago!

MEASURES BRIDGE TRAFFIC.

A NEW instrument devised by the Bureau of Public Roads of the Department of Agriculture measures with scientific precision the effect of every shock and blow delivered by moving vehicles in crossing a bridge. Attached to any part of the bridge structure, this instrument makes a photographic record of the effect of the moving load. The amount of stretching or shortening of the part as a result of the shocks is represented by a fine black line on the photograph.

No blow or shock can be delivered so quickly that the instrument will not record its effect. It has never before been possible to measure the effect of such blows. Engineers have long been able to calculate the effect of standing loads very exactly; but because of their inability to measure the effect of quickly delivered blows or impacts, they have never been able to proportion the various parts of a bridge with assurance.

Many bridges still in service are probably too weak to withstand safely the sharp blows of swiftly moving vehicles, though they will safely carry the same vehicles at rest or moving at slow speed. The familiar warning posted at the portals of a bridge: "Speed limit on this bridge eight miles per hour," means that the design of the bridge to which it is attached is not strong enough to allow for impact. In the light of the recent experiments with motor trucks in which it was shown that a swiftly moving motor truck may strike a blow equivalent to seven times its actual weight, it is rather surprising, the department road experts say, that failures have been so few.

Overhead Valve Grows in Favor

*Is Economical and Powerful—Develops High Torque
—Has Small Piston Displacement Due to Form of
Combustion Chamber—Is Easily Accessible.*

DURING the past few years the garage and repair shop proprietor has become educated to the fact that the I-head, four-cycle automotive engine, commonly known as the overhead valve engine, is best adapted to motor truck and tractor power plants because of its snappy power, economy, greater torque per cubic inch of piston displacement.

Previous to 1908 the I-head engine was little known, and then only as a two-cylinder opposed engine, and about this time one of the prominent passenger car manufacturers introduced this engine to the public as a four-cycle, four-cylinder, ver-

quired it, and this with the dust caused excessive wear.

Accessories in the shape of coiled springs were early placed on the market by independent accessory manufacturers, which were claimed to eliminate this noise by holding the rocker arms under spring tension usually provided at the side of the rocker arms, or it may consist of a spring cap which is fitted over the top of the push rod between the push rod and rocker arm, taking up the lost motion between the rod and arm.

During the last two or three years improvements have been made in this type

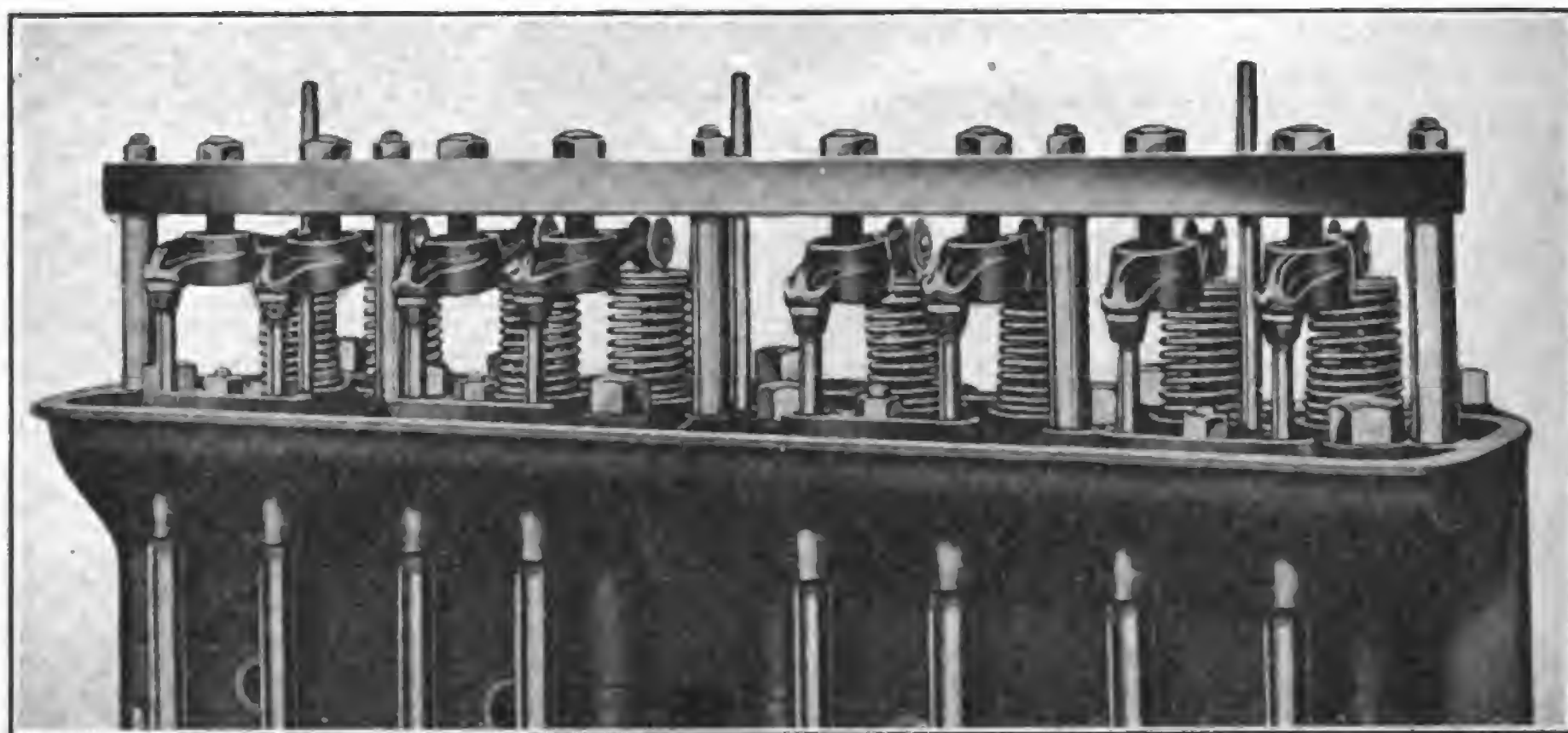
the noise of the valves. Lubrication is supplied either by hand, feeding the oil at long intervals to the drilled rod to which the rocker arms are fitted and from which they obtain their lubricant, or by a mist from the engine base, which is forced by crank case compression through hollow tubes surrounding the push rods, leading to the valve mechanism chamber. The excess mist after lubricating the valve mechanism passes through a breather pipe in the top of the cover and is dissipated into the air.

Either method supplies constant lubrication to the valve chamber, the latter allowing the mechanism to work in a constant fog of oil when the engine is operating.

Overhead Valve Mechanism Improvements.

Improvements have been made in the manner of supporting the rocker arms and it is found in the later designed engines that the ends of the rocker arms rest respectively on the push rod at one end and the valve stem on the other end with the center or fulcrum positioned against an adjustable bolt and nut fastened in a rigid bar supporting all adjustments, which may consist of four or six, according to the number of cylinders used in the block. This type of arm support is styled the "rocking chair" support because of its ease of adjustment when the engine is operating, and from the fact that the arms perform their work with a minimum of wear.

Many owners prefer to service their vehicles at home and the overhead valve engine lends itself readily to this class on account of the ease with which the valves can be removed for grinding and the



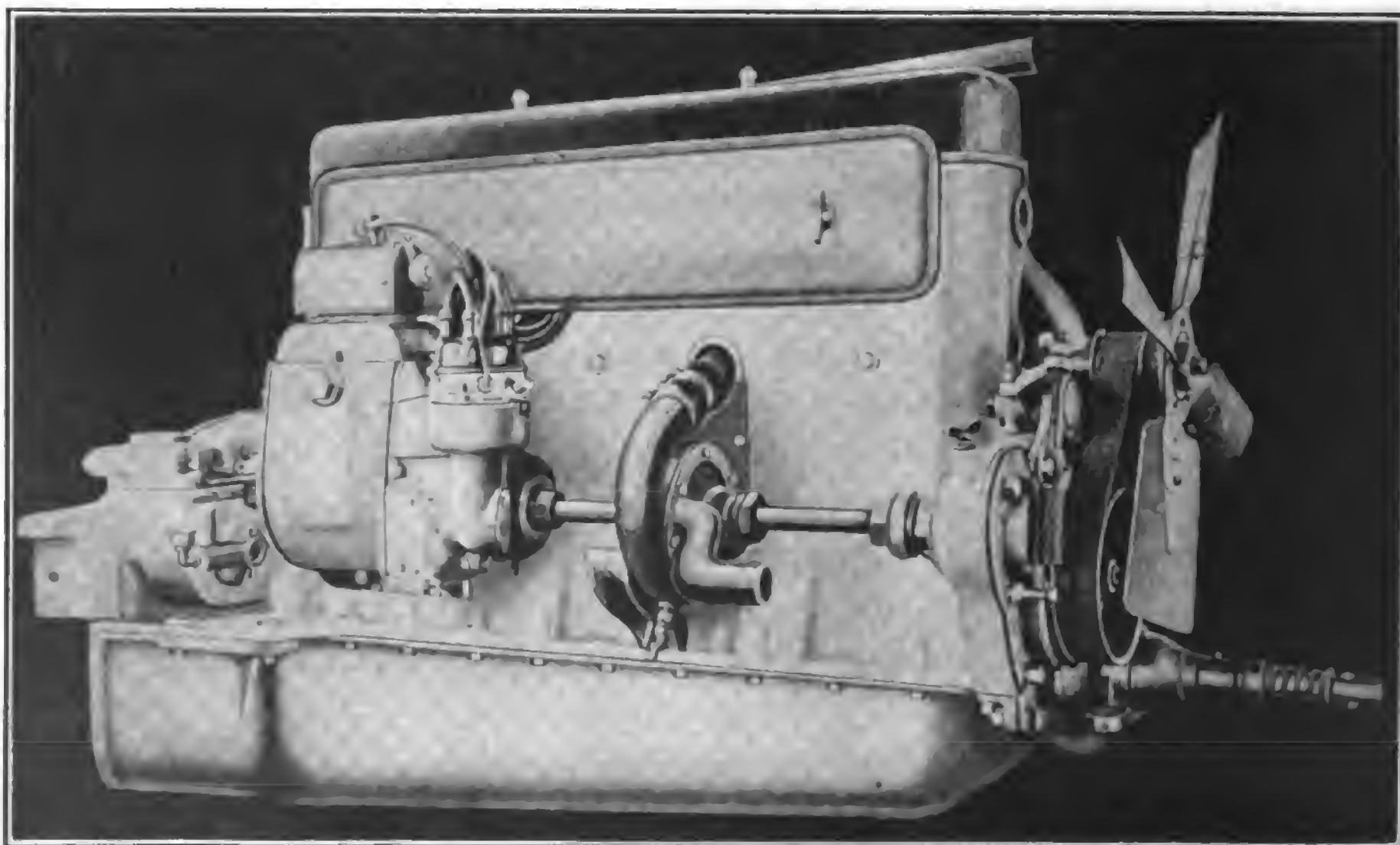
Latest Rocking Chair Type of Overhead Valve Mechanism Which Is Becoming Very Popular—Allows Valve Adjustment While Engine Is in Operation.

tical engine, using it in a light-weight, medium-priced car, which proved very popular with the trade. This company has continued to use this type of engine each succeeding year, improving it in various respects, till at the present time it has reached a state of perfection which practically fills the wants of the most discriminating motorist.

A few years later other car and truck manufacturers, recognizing the advantages to be gained by using this type of engine, began to equip their cars with a modified form of the original I-head, four-cylinder, four-cycle engine. At the present instance fully 20 per cent. of the car and truck manufacturers, according to available figures, are using overhead engines for standard power plants in the vehicles which they manufacture.

In past years much criticism was directed against this type of engine in that after it had been in use for a short period it would become noisy. The overhead valve mechanism was located in the open where dust and grit, blown in through the radiator by the fan, could easily reach the rocker arm and push rod bearings, the abrasive action of which quickly cut the bearings, allowing them to become noisy. Then, too, owners would fail to lubricate the bearings as often as they re-

of engine which deadens the noise of the valve mechanism, and supplies sufficient lubricant at all times. The valve mechanism is covered with a metal cover which is easily removed when desired, protecting the mechanism and deadening



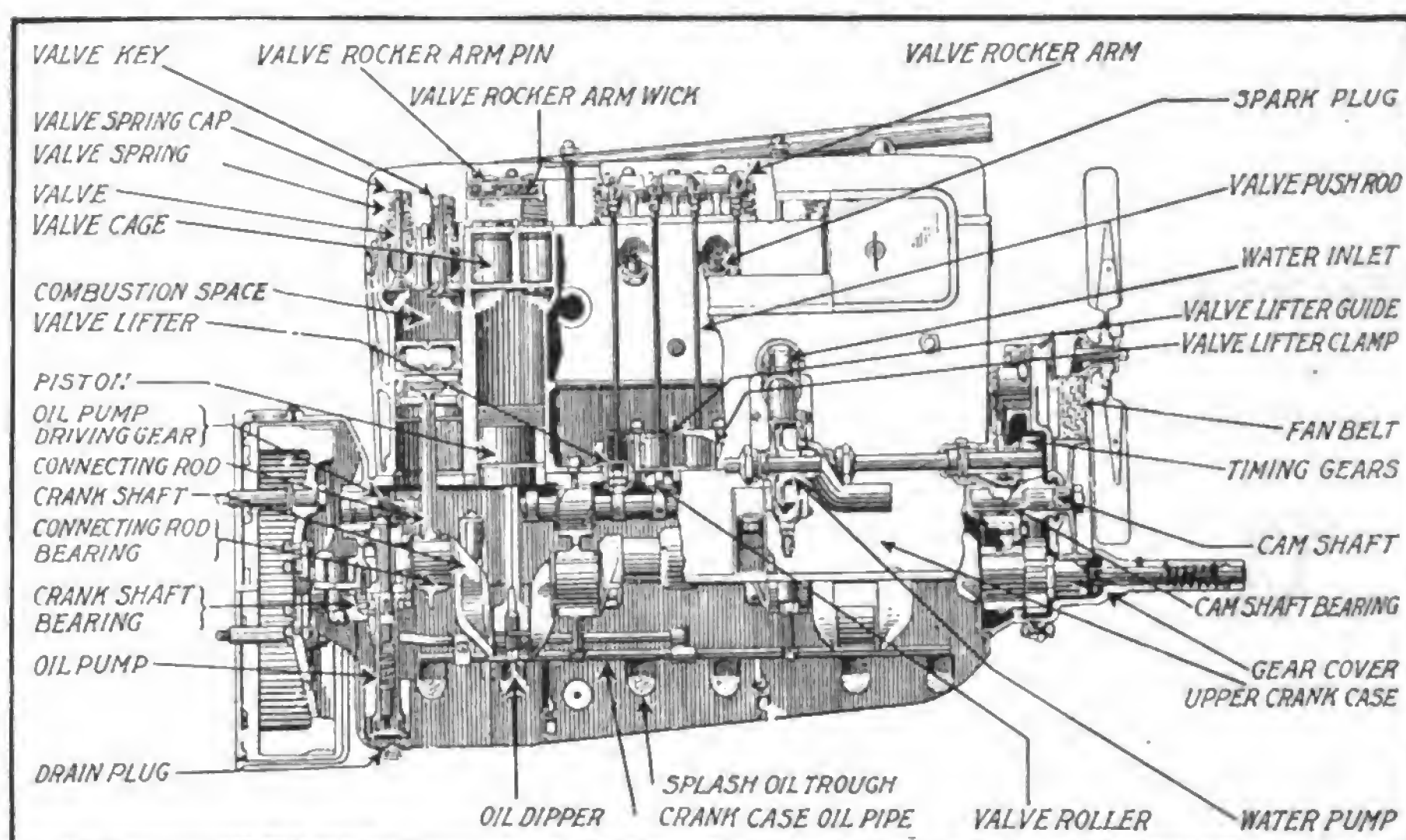
Buick Engine with Overhead Valve Mechanism Completely Enclosed—Removable Covers to Spark Plugs and Valve Mechanism Provide Accessibility.

cleaning of carbon deposits from the engine combustion chambers.

There are two types of overhead engines in use, both of which are proving very popular at the present time. One type is fitted with a removable head, separated from the cylinder block casting by a copper asbestos gasket, having the valves positioned in valve seats milled in the under side of the head and extending through the head in guides. To grind the valves of this type it is necessary to loosen the holding nuts of the removable head, removing the head and valve mechanism as a unit, and grinding the valves at the work bench. The second form does not use a separable head, but the valves are positioned in the cylinder heads in removable cages, held in place by means of a locking ring with copper asbestos gaskets above the valve cage and under the locking ring. The valves are removed one at a time and ground by hand in a vise at the work bench. The vise holds the stem and the cage is turned by hand. This latter type is similar in construction to the original overhead valve four-cylinder vertical engine introduced in 1908 and has been retained by this company in all later car and truck models. Statement is made that this type of engine is somewhat more costly to build, but that the accessibility of the valves and valve mechanism more than offsets the original first cost so that the company feels justified in retaining it.

The removable head type previously mentioned also offers accessibility as a feature and other points which are of interest to the motorist who services his car.

A feature which applies especially to



Typical Six-Cylinder Overhead Valve Engine Showing Various Units Clearly Lettered.

the overhead valve engine is that there are no side pockets to retain the burned gas after the explosion has occurred and the piston on its return stroke has scavenged the combustion chamber. All burned gases are quickly expelled and the incoming charge of new gas is not mixed with burned gas. The flame area of the combustion chamber is small so that all of the mixture is ignited practically at the same instant, giving a clean, powerful explosion, which acts at once on the head of the piston, developing the utmost power from the charge of gas. The piston displacement in cubic inches is in reality smaller than in other types of engines and this feature, combined with an

explosion using all of the burned gas, gives a power plant which is at once powerful and economical.

The oiling system is also a feature of this type of engine which shows economy, many of these engines operating for long mileages before it is necessary to replenish the oil supply.

For hill climbing, power and accessibility the overhead valve engine has established a place among power vehicle users in general which cannot be shaken. That other manufacturers of trucks and tractors are realizing this situation is shown by the ever-increasing number who choose this type of power plant, this being especially noticeable this year.

POINTS ON MOTOR TRUCK CARE.

Motor trucks are equipped with efficient cooling systems when they leave the factory, but should receive a certain amount of care in the hands of owners to function properly under all conditions. The radiator has a liberal water capacity and the radiator core is so designed as to give maximum cooling efficiency. The fan is of approved design and usually the water pump is of the centrifugal type, providing a positive circulation.

In hot weather the cooling system should be drained often and replenished with clean, fresh water. The fan belt and fan should be examined for looseness of the belt, tight bearings or loose fan blades and if trouble is found it should be remedied at once. A loose fan belt will surely cause overheating as quickly as restricted circulation and should be prevented by tightening. The water hose connection between the radiator and engine should be examined for soft spots which would restrict the circulation.

Cooling System Plays Important Part.

In adding water to the cooling system, if centrifugal pump is used, it is not necessary to bring the water closer than two inches from the top of the radiator, for the water, when heated by the engine, takes up more room than when cold, and fills the radiator completely. On the other

hand, always keep the radiator water level, at least one inch above the top ends of the core tubes, to insure an even distribution of water to all tubes in the core when the engine is running.

One should bear in mind that for a radiator to function properly it is necessary that an adequate and steady flow of water through it is assured, and likewise that all of the fresh air possible is drawn over the core tubing by the fan, as it is this supply of cool air which is expected to absorb the heat from the radiating fins. Care should, therefore, be taken to see that the fan belt and the fan bearings are kept in good condition, as in truck work especially the speed of the vehicle in motion is relatively slow and is not sufficient to insure the circulation of an adequate supply of air through the radiator without the aid of an efficient fan in good operating condition. In other words the radiator must be fed an adequate supply of water and air to be used over and over again in the case of the water, in the same manner as one expects to feed fuel to an engine for its operation.

CLEANING SPARK PLUGS.

Dissolve two tablespoonfuls of lye in one quart of water and keep the spark plugs in the solution for 24 hours. Then remove them and they will be found perfectly clean and ready for use.

DO NOT RACE THE TRUCK ENGINE.

Truck drivers should never allow their engines to race. This is a rule that should be strictly obeyed if an efficient, long-lived power plant is desired. Running an engine at top speed has a much greater pounding effect at the different bearing points than the smooth rubbing effect when running at idling speed, say 300 revolutions a minute. Consequently, racing an engine wears out the bearing surfaces very rapidly, reducing its efficiency and shortening its life. Racing an engine is certain to put excessive strain on all of its parts and will result in many big repair bills.

It is a well known fact that to race an engine when it is very cold is likely to result in scored pistons and cylinders. It may even cause the breakage of certain metal parts, which are very brittle when cold. The engine should be run slowly, allowing the metal to warm up gradually. The cold oil in the crank case will at the same time gradually warm up and can be forced to all of the engine parts needing lubrication. When the oil is cold it is thick and heavy and does not give proper lubrication at once, as it will not flow readily until it is warm.

Racing an engine or keeping it throttled to a high speed while driving causes a greater consumption of gasoline.

TRUCK TALK

PANACEAS AND POTENTIALITIES.

WITH 10,000,000 cars and trucks in use the selling of used cars is becoming a major business requiring the dealer's attention as fully as his new car trade. Dealers from all parts of the country report that this end of the business is to be more fully recognized and used car shows, rebuilding and sales plans will receive more attention than ever before.

The auction room has been enthusiastically spoken of as a practical solution of the used car problem. Our judgment in this matter, which is backed by actual experience, causes us to doubt that this method will work out satisfactorily, as proof of which we give the following brief account of an auction "sale" which we attended a short time ago.

THERE were 13 cars offered at the sale, which took place in an eastern city. The auctioneer was an old timer who knew his business thoroughly. The auction room was well lighted and the crowd was composed for the most part of substantial men well able to buy had they chosen to do so. Under the terms of the sale the auctioneer reserved the right to reject any and all bids. It was announced that there were no "cappers" present and that the whole thing was to be run on an honest basis, and in our opinion these principles were strictly adhered to.

The following is a stenographic report of what took place at the sale:

1. Maxwell, 1919, \$100 high bid. No sale.
2. Buick, 1917, \$275 high bid. No sale.
3. Federal truck, 1917, no bid.
4. Marmon, 1915, \$78 high bid. No sale.
5. Oakland Sedan, 1921, \$350 only bid. No sale.
6. Chevrolet, 1915 F. A., \$150 high bid. No sale.
7. Ford truck, 1916, \$75 high bid. No sale.
8. Olds Eight, 1917, no bid.
9. Interstate 1915, \$50 only bid. No sale.
10. Reo Four, 1917, no bid.
11. Dodge, 1919, \$450 high bid. No sale.
12. Garford Truck, no bid.
13. Cadillac, 1915, \$50 high bid. No sale.

The cars offered were in good condition. The auction was conducted in a thoroughly above-board manner by honorable business men who had the best interests of the business at heart. The auctioneer was a world-beater—and yet he didn't succeed in selling a car. At the prices bid no one could blame him for refusing to sell except perhaps in the case of the Dodge which, as will be noted, received only a fair bid.

"One swallow does not make a summer," especially in these dry times, and certainly one auction does not rightly constitute a precedent on which to base a hard and fast opinion—nevertheless, we are well-nigh convinced that this method of handling used cars will never become widespread. Certainly it won't go very far to solve the problem, and we'll guarantee that anyone who sees a good fair trial of the proposition, as we did, won't get wildly hilarious over it as a panacea for used car troubles.

"THREE WISE MEN."

WE REALIZE the amazing age we are living in when we stop to think that the men who invented the three greatest every-day features of civilized progress are still hale and hearty and a lot more youthful than many who are their juniors. Thomas A. Edison invented the electric light, Alexander Graham Bell invented the telephone, Elwood Haynes invented the motor car. We are so accustomed to all three of these that we must make an effort to realize that a few years ago the electric light, the telephone and the motor car were curiosities. Not many people believed they would ever be practical. A carriage ran without horses, light came from a vacuum and two men talked to each other at the same time a thousand miles apart.

Yet not one of the three men, mentioned as inventors, appears to have sat down and tried to do the miraculous. Each of them patiently worked to create something practical—something which would serve humanity. Each of them had foresight—had vision. None of them cared two whoops for ridicule or criticism. Elwood Haynes saw his invention sweep the world inside of a

quarter of a century. His first car stands today in the Smithsonian Institution, where you will also see Edison's first work and Bell's first telephone, three objects which continually attract the attention of visitors.

The prophet who said "Old heads for wisdom," stands silent in the face of the contradictory evidence offered by the achievements of these three young men.

AMEND CAR THEFT ACT.

AN AMENDMENT to the national motor vehicle theft act has been ordered favorably reported by the Senate Judiciary committee. This imposes a fine of \$5000 and up to five years' imprisonment on anyone who transports or receives cars "over state lines with intent to defraud."

This act is a mighty commendable one and a long step in the right direction. But why the qualifying clause with regard to boundary lines? It looks as though some of the larger states would receive little benefit from such legislation, which, while it would work out in a satisfactory manner in a state like New Jersey, would be of little use in a territory the size of New York or Texas. The framer of this amendment undoubtedly had some tangible reason for taking the teeth out of it, but we'll bet a Pittsburgh stogie that the layman can't guess it!

CLASSIFYING THE HIGHWAYS.

THAT a public road-building policy requiring road classification according to traffic statistics, as well as responsibility for construction and maintenance, is necessary in order to carry on successfully a good roads programme in this country is the gist of a treatise issued recently by the Nebraska Department of Public Works, on "How to Get Good Roads." The classification policy, the Nebraska officials point out, has been found upon adoption abroad to be a highly successful one for highway improvement.

"That which has secured roads overseas," says the bulletin, "should secure them here. First: There is the country road—Its primary function is to service county needs. While its function is vital, linking farm and market, its use is mainly local. The county, therefore, should assume responsibility for it. It should be built and cared for by county funds. Exception should be made of certain roads in the counties whose function

places them in another class, that of state or federal roads. Second: There is the state highway, the aggregate of which constitutes the state highway system.

Then there are the roads which, while serving local needs in the counties, have for their primary function highway service to the state as a whole. The system is usually planned to connect the county seats and all these and the various sections of the state with the state capital. The state therefore, should assume responsibility for these roads. They should be built and cared for through state taxation. Exception should be made of certain roads in the states whose function places them in a third class, that of national roads, which of course should be maintained by the federal government."

WHO SAID BAD BUSINESS?

THE registration of motor vehicles in New York from Jan. 1 to Sept. 1 was 42,053 more than was registered with the secretary of state all last year, according to a recent compilation made by H. D. McClelland, superintendent of the automobile division in the state office. The eight months' registration of passenger car was said to be 35,622 more than the entire 1920 registration of such cars. The truck registration in the eight months exceeded the entire 1920 truck registration by 6431. Approximately \$3,000,000 will be distributed this week by John Lyons, secretary of state, in the monthly division of motor vehicle receipts between the state and counties. The sum is the largest ever distributed from this source by the office of the secretary of state.

New York City's share of the \$3,000,000 will be \$433,187.38. This sum will go into the city's general fund. Up to July 1 the Motor Vehicle Bureau had receipts of \$9,289,363.32, accruing from the registration of automobiles and motorcycles and the licensing of chauffeurs and operators from Feb. 1. This sum establishes a record. In the light of pessimistic foreboding made by many so-called industrial experts, the preceding figures are certainly interesting. They show that the largest city in the United States is buying cars with an apparent abandon that savors of war-time conditions. They also delineate in striking manner a resumption of normal business, since New York is the first great city in the land to feel the result of either good or bad times. Mighty encouraging we call it.

Develops Speed Truck

Gramm-Bernstein Model 15 Result of Extensive Research and Experiment on Part of Capable Engineers—Is Amply Powered and Well Equipped

TWENTY years of successful truck building experience are incorporated in the Model 15 1½-ton speed truck which has been designed especially to meet the ever increasing demand of general purpose haulage where speed is of first importance. Power farmers are particularly interested in trucks of this capacity, while department stores, hardware merchants, express and freight haulers, and general service truck men find that a truck of this capacity meets their every need. The capacity is sufficient, and although more trips may be required to move a given amount of material, still the operating expense will be found to be sufficiently low when compared to larger models which may perhaps carry all of the material at one load. This is highly important in general haulage as the next job that the truck is called upon to perform may not require the full capacity of the truck, making the use of a truck of larger capacity prohibitive.

TWO decades of successful truck building by the Gramm-Bernstein Motor Truck Co. of Lima, O., have naturally developed a better truck, that will last longer in every day use and that is able to perform to better advantage and at a considerably lower cost.

Several well known standard units are used in the construction of this truck, while there are also included many other units strictly of Gramm-Bernstein design.

Model 15 Amply Powered.

The Model 15 1½-ton speed truck is amply powered by a Continental Red Seal N, four-cylinder, four-cycle, L-head, vertical engine, having a bore of 3¼ inches and stroke of five inches. The engine develops 22.5 horsepower under the N. A. C. C. rating, which is sufficient for all power purposes the truck may be called upon to perform.

Cooling is accomplished by means of a special Gramm-Bernstein fin tube radiator, fitted with core of Long manufacture, and thermo-syphon system of water circulation. A four-bladed fan driven by belt from the timing gear set provides suf-

ficient draft to cool the water as it passes through the tubes of the radiator. The construction is similar in design to the type adopted by the government for use on the Class B Liberty truck. It is fitted with cast top and bottom tanks with the tubes fitted with helicoid radiator fins to facilitate cooling. The header and base plates are of pure copper and it is claimed to be the simplest, most efficient and trouble free cooling unit in existence.

Lubrication is furnished the engine rotating units by splash from troughs under the connecting rod bearings which throw the oil to every moving bearing and moving unit of the interior of the engine, supplying positive and accurate lubrication wherever needed.

The engine equipment includes such well known units as a Stromberg carburetor fed by gravity from the fuel tank located in front of driver on the dash, which has ample capacity for many miles of travel. Starting, lighting and ignition are furnished by a Northeast unit and Willard storage battery.

The clutch, which is a Fuller multiple-

disc type, is located in the face of the fly wheel and is enclosed with the fly wheel in the standard S. A. E. bell housing which forms a part of the engine lower crank case. The transmission, which is also of Fuller manufacture, is bolted to the fly wheel housing, and consists of a three-speed forward and one reverse selective sliding gear type, which is in a unit with the engine, preventing abrasive action from dust. The universal joints are of Gramm-Bernstein design, metal covered to prevent dust working in and causing abrasive action or wastage of lubrication. Two joints are used, one at either end of the hollow propeller shaft, to care for the angularity of drive.

The rear axle is a Clark internal gear-driven type equipped with dead axle and live drive shafts to the spur pinions in the wheel drum master gears. The total gear reduction on high is given as 7.6 to one and the total gear reduction on low as 30.4 to one.

Perfection springs are standard equipment. They are of the cupped type and are constructed from chrome vanadium steel with all eyes bushed with phosphor bronze. The front springs are composed of 10 leaves, 2¼ by 40 inches, and the rear springs are 11 leaves, 2¼ by 52 inches. All spring bolts are hardened and ground and equipped for the wick and Alemite oiling system.

The frame is unusually staunch and is made of pressed steel channel in one straight section without bends or horn type front ends which are so easily damaged. The frame is five inches deep, by 2½ inches, by 3/16 of an inch. The front spring hangers are cast separate and hot rivetted to the frame members at the corners, providing additional reinforcement at the corners and giving a rugged bracket construction to the front spring. All corners of the frame are extra well braced to prevent transverse strains and all holes are drilled and not punched, while the rivets are driven hot, perfectly filling the holes.

The front axle is a drop-forged, I-beam, heat-treated and fitted with tapered roller bearings of ample size. The tie rod is at the rear of the axle and consequently is out of the way of damage.



Several Well-Known Units Are Used in This Truck Which Develops 22.5 Horsepower from Continental Red Seal Engine.

Announces New Model

Penn Motors Corporation Expects Large Amount of Business from Latest Truck Offering—Is Primarily Designed for General Purpose Use.

PENN MOTORS CORPORATION, 1714 North Broad street, Philadelphia, Pa., in announcing its 1921 model two-ton general purpose truck, states that it expects a large amount of business with this model from express and general haulage concerns.

The new truck is constructed along conventional lines and embodies standard units which have proven their worth through long periods of use and experimentation. While the truck is an assembled product, the units have been time tried and are the best to be found among assembly manufacturers.

The Penn two-ton truck is amply powered by a Buda MU four-cylinder, four-cycle, vertical, L-head engine having the cylinders cast en bloc and the valve mechanism located at one side and enclosed with a cover plate which prevents the entrance of dust and silences the valve mechanism when the engine is operating.

CYLINDERS have a bore of 3½ inches and stroke of 5½ inches, a piston displacement of 211.6 cubic inches and under the A. L. A. M. rating develops 21 horsepower, while under brake test at the factory the engine shows a horsepower of 39.5.

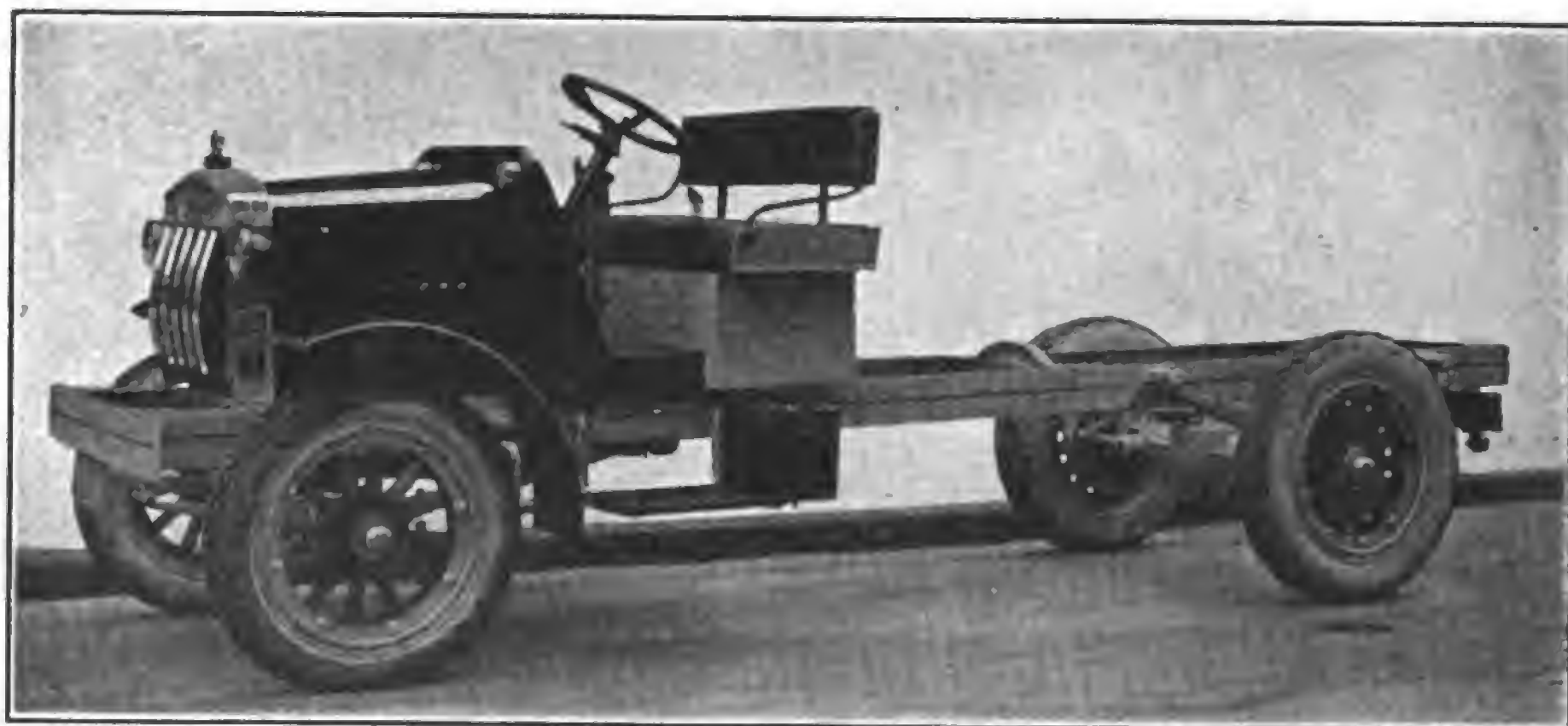
The engine cylinders are cast en bloc and the clutch and transmission are in a unit with it, making a dust-tight case, which prevents the entrance of dust or the loss of lubrication. The engine is provided with three-point suspension of a conventional type which has been demonstrated as being the best for motor trucks.

Water is circulated by means of a centrifugal water pump driven from the timing gear set of the engine, the water passing through a plain tube type radiator core and cooled by a power-driven fan fitted at the back.

Carburetion is supplied from a Zenith automatic carburetor fed from a gravity fuel tank located under the driver's seat. Ignition is furnished by a Bosch high-tension magneto, having the spark control lever located on the steering wheel post below the wheel. Lubrication is full force feed to the crank shaft and cam shaft bearings with direct feed to the timing gear case.

The clutch is a Fuller multiple-disc type using 12 facings of 10 inches diameter, one plate of steel in contact with two plates of friction material. The transmission gear set is of Fuller manufacture, selective sliding gear type, consisting of three speeds forward and one reverse, in a unit with the engine and clutch. The ratio on the third speed is direct; on the second speed, 1.7 to one; on the first speed, four to one, and on the reverse, 3.5 to one. Ball bearings are used throughout in the transmission gear set.

The rear axle is a Wisconsin worm drive having a gear ratio of 8¼ to one, while the front axle consists of a drop-forged, I-beam section, 2½ inches wide with a web ¼-inch thick, while the hubs are fitted with Timken bearings. The service brakes consist of one set of internal expanding, 17-inch diameter brakes, 2½ inches wide, operated by the foot and one set of emergency brakes, internal ex-



The Penn Two-Tonner Is Equipped with Buda MU Four-Cylinder, Four-Cycle Engine. Develops 21 A. L. A. M. Horsepower.

panding, 12½ inches diameter and 2½ inches wide, operated by hand lever in the center of the floor boards at the right of the driver.

The springs are semi-elliptic front and rear. The front springs are 40 inches long, 2½ inches wide and composed of eight leaves; the rear springs are 50 inches long, three inches wide and composed of 12 leaves. The spring eyes are fitted with bronze bearings and patent oilers which supply the bearings with sufficient oil at all times.

The wheels are S. A. E. standard artillery type, made of well seasoned, second-growth hickory, 12 spokes in the front and 14 spokes in the rear wheels.

The steering wheel is located on the left side in the conventional position with the gear shift lever at the right of the driver. An accelerator pedal is on the floor and the magneto short-circuiting switch on the dash.

The frame of the chassis is made of channel steel, six inches deep, 33 inches wide in the rear, with an insweep of 31 inches in front, heavily reinforced with cross members. The length of the frame back of the driver's seat is given as 124 inches. The wheelbase of the Penn two-ton truck is 144 inches and the tread 56 inches.

The equipment includes Bosch electric starter and generator, a full set of electric lamps and an Exide battery. A Stew-

art electric horn, motor-driven, is included, as well as a motor meter, pressed steel front fenders, power tire pump driven from the power take-off of the transmission, complete with hose and pressure gauge. A full set of high-grade tools is also included.

The Penn two-ton truck may be equipped with either solid tires, cord pneumatics on front and solid tires in rear, or all cord pneumatics at the option of the purchaser, the price of the chassis being governed by the choice.

Solid tire equipment consists of 34 by four-inch tires in front and 38 by seven in rear. Non-skid cord pneumatics are, front, 34 by five-inch; rear, 38 by seven-inch.

The price of the chassis complete with solid tires is \$2500 f. o. b.; with pneumatic front and solid rear tires, \$2600; and all pneumatic, \$2700 f. o. b. A full line of bodies of various types are always kept in stock by the company and can be supplied special to order.

RUBBER TIRES IMPORTED TO MALAY STATES.

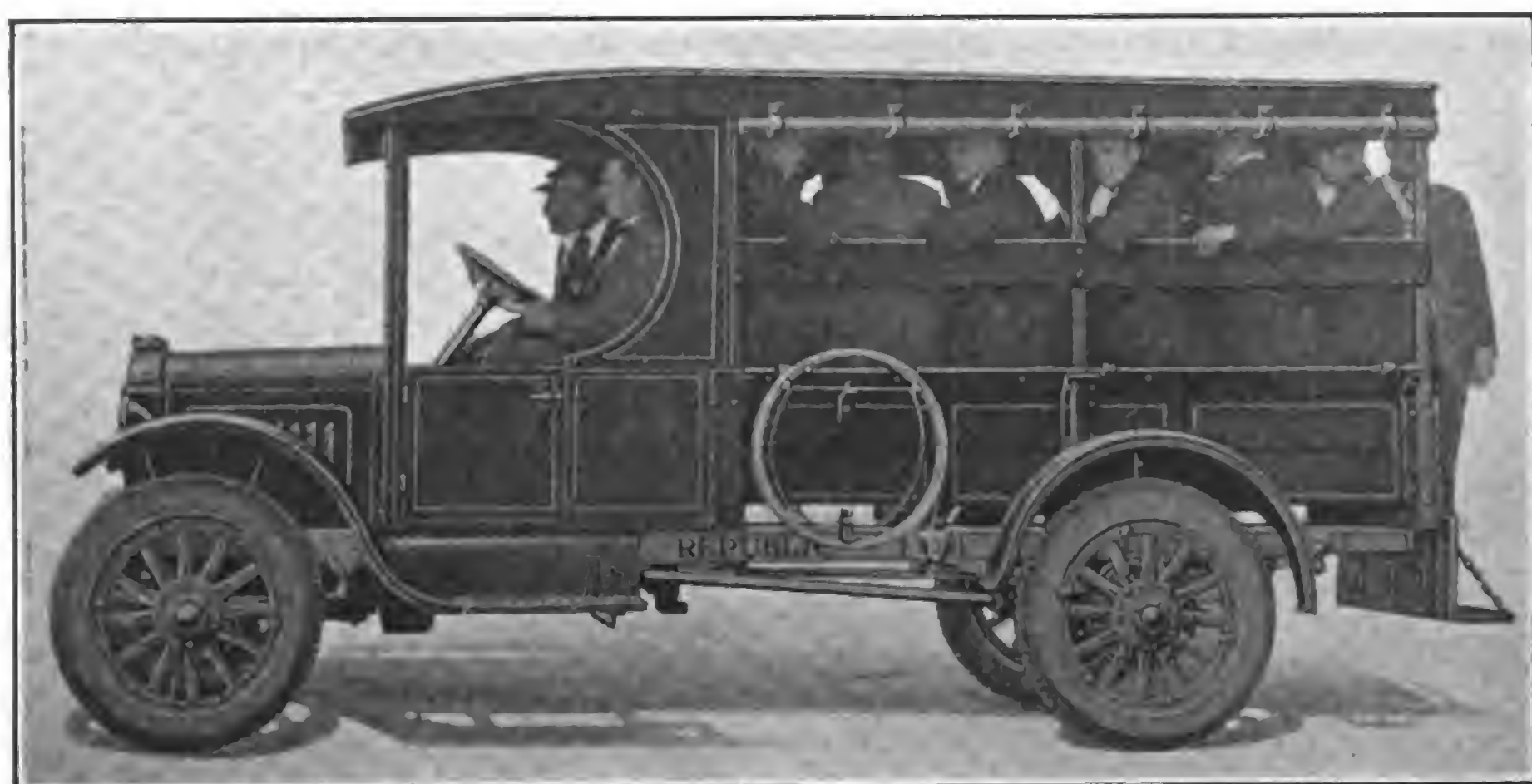
During the first quarter of 1921, rubber tires were imported to the Federated Malay states to the value of \$114,843. The value of these imports for the corresponding quarter of 1920 was \$305,006.

Predicts Good Business

Republic Sales Corporation States Model 75 Rapid Transit Meeting with Favor—Is Adapted to All Kinds of Road and Climatic Conditions.

REPUBLIC SALES CORPORATION, Alma, Mich., in announcing its new Model 75 Rapid Transit motor truck, states that quantity production is now under way and that dealers in all parts of the country predict a big year's business with this new model.

The engineering and production departments at the Republic factory during the past year have conducted far-reaching and exhaustive investigations and tests of the new Republic Rapid Transit in a large number of widely scattered cities throughout the United States, taking in practically every kind of road and climatic condition, as well as general topography.



This New Republic Truck Is Well Designed for Use in Country and City—It Should Prove a Popular Model for Those Desiring a Speedy, Substantial Motor Vehicle.

POWER for the operation of the new Model 75 Rapid Transit Republic truck is furnished by a Lycoming Model KD four-cylinder, four-cycle, L-head, vertical engine, having a bore of $3\frac{1}{2}$ inches and stroke of five inches, developing under N. A. C. C. rating 19.6 horsepower, especially designed for hard, consistent service. Cooling of the engine is by means of an efficient thermo-syphon system and 15-inch fan mounted in the rear of the cellular type radiator and driven by a belt from the engine timing gear set pulley. The radiator is of Republic design and follows closely that of previous models.

The engine is equipped with the Stromberg carburetor, using the well-known vacuum feed, with the fuel tank located under driver's seat and having a capacity of 14 gallons. A hot air supply is assured from a stove attached to the exhaust manifold which causes the gaseous mixture to vaporize quickly before entering the combustion chambers.

Ignition is furnished by an Auto-Lite distributor and breaker box operating in connection with the Auto-Lite starting and lighting system in use on the truck for starting the engine and lighting purposes.

Lubrication by Pressure and Splash.

Lubrication of the engine and its units is accomplished by means of a pressure and splash system supplied by the oil

reservoir and a power operated pump in the engine base, which supplies oil under pressure to the main journals, connecting rod bearings, cam shaft bearings and timing gears under pressure, while other reciprocating units are oiled by the splash of the connecting rod bearings in the oil troughs under the rods.

The clutch is a multiple-disc, dry-plate type, enclosed in the standard S. A. E. fly wheel housing, which also joins the transmission gear set, en bloc with the engine and clutch. Both units are of special Republic design which has been time-tried in earlier models. The transmission gear set is equipped with three speeds forward and one reverse speed, the final drive gear ratio allowing the truck a speed suitable for quick delivery purposes.

Spicer universal joints connect the propeller shaft at either end to the transmission gear set and the pinion of the internal gear driven rear axle, the drive being through a special hollow steel propeller shaft, also of Republic design.

The transmission gear set control consists of a lever located in the center of the floor boards at the driver's right, and works on a ball and socket joint of the cane shift type, which is very easily operated and positive in action.

The springs are semi-elliptic, front and rear, of generous size with a wide margin of safety provided for overloads, and

are of Mather design. The Hotchkiss drive system is used, which takes up the twisting effect exerted on the rear axle by the driving pinion, through the unusually large springs, shackles and hangers.

The rear axle is a Republic-Torbensen internal gear driven type, and is equipped with a drop-forged, I-beam load-carrying member, while live axle shafts transmit power to the internal gears at the hubs. The axle is equipped with roller bearings throughout and forms a simple, easily accessible unit.

The front axle consists of a drop-forged, I-beam section, cast with yokes integral, and fitted with drop-forged steering knuckles of heat-treated alloy steel and tapered roller bearings in the wheel hubs.

The braking system is located on the rear wheel drums and consists of an emergency set of the internal expanding type and service set of the external contracting type. Both sets are easily accessible and by means of conveniently arranged brake linkage are easily adjusted or taken up as necessity requires. The bands are 14 inches in diameter and use brake lining two inches in width.

The final gear ratio on high is 6.3 to one; first speed, 17.64 to one; second, 11.15 to one; third, 6.3 to one; reverse, 22.68 to one.

The wheels are of the artillery type, 12 spokes front and rear, equipped with demountable, detachable rims. The tire equipment consists of 32 by $4\frac{1}{2}$ -inch cords, truck non-skid type, front and rear.

The steering gear is a Jacox, of the worm and split nut type, which is irreversible and adjustable, located on the left side of the truck and is equipped with snark and throttle control on the top of the $17\frac{1}{2}$ -inch steering wheel.

Chassis lubrication is provided by a high-pressure grease system throughout supplied from a pressure gun which is able to force out all old grease and dirt and supply the slow-moving bearings with fresh lubricant, while the brake cross shafts are mounted in Oil-Less bushings.

The standard body equipment includes canopy top express fitted with cab and adjustable ventilating rain-vision windshield. The cab and canopy top are completely equipped with curtains and can be entirely enclosed.

Changes Desert to Garden

Imperial Valley Is Transformed by Modern Highway Methods into More Than Half a Million Fertile Acres—Causeway Built Below Sea Level.

(By J. L. TRAVERS, Secretary, Imperial County Highway Commission, El Centro, Cal.)

TWENTY years ago Imperial Valley was an almost uninhabited desert in the ancient bed of the Gulf of California. Today it serves as the garden of a dozen states. Its vegetables, long staple cotton, alfalfa and dairy products are famous throughout the country, and its grape fruit and cantaloupes are shipped East by the hundreds of car loads. Such products mean intensive farming, rapid growth in population, and heavy traffic to the shipping points. Imperial county is adding to her other splendid achievements the construction of a system of paved roads, and in 1920 awarded a contract for over 30 miles of concrete, which will improve several important links in her highway system. After the various centers are connected by county and state paved roads, doubtless the more important side roads will be hard-surfaced.

WORK is now under way on the 1920 contract, two mixers being operated along with other modern equipment.

An account of the remarkable transformation brought about by irrigation must start in 1893, when the first reconnaissance surveys were made by C. R. Rockwood, afterward chief engineer of the district. Despite continued difficulties in securing financial support, Mr. Rockwood persevered until in 1901 the first small stream of water diverted from the yellow flood of the Colorado near the Mexican border at last reached the settlement of Imperial. In that year a party of 24 from San Diego came over the steep mountain trail in six-horse tallyhos to witness water actually flowing through the canals. Their interest can be measured by the time spent en route each way—three days. At present a state highway, which is concrete much of the distance and eventually will be paved for its entire length, leads from San Diego to El Centro, and the 125-mile trip can be made in from four to five hours.

The barrenness of the land before water was brought in can be visualized when it is known that the annual rain fall is between one and two inches. But water was all that was lacking, for the growing

large amount of sediment which irrigation deposits upon the fields, thus adding to their fertility. Nine cuttings of alfalfa are customary. Cantaloupes may follow head lettuce and be off the ground by



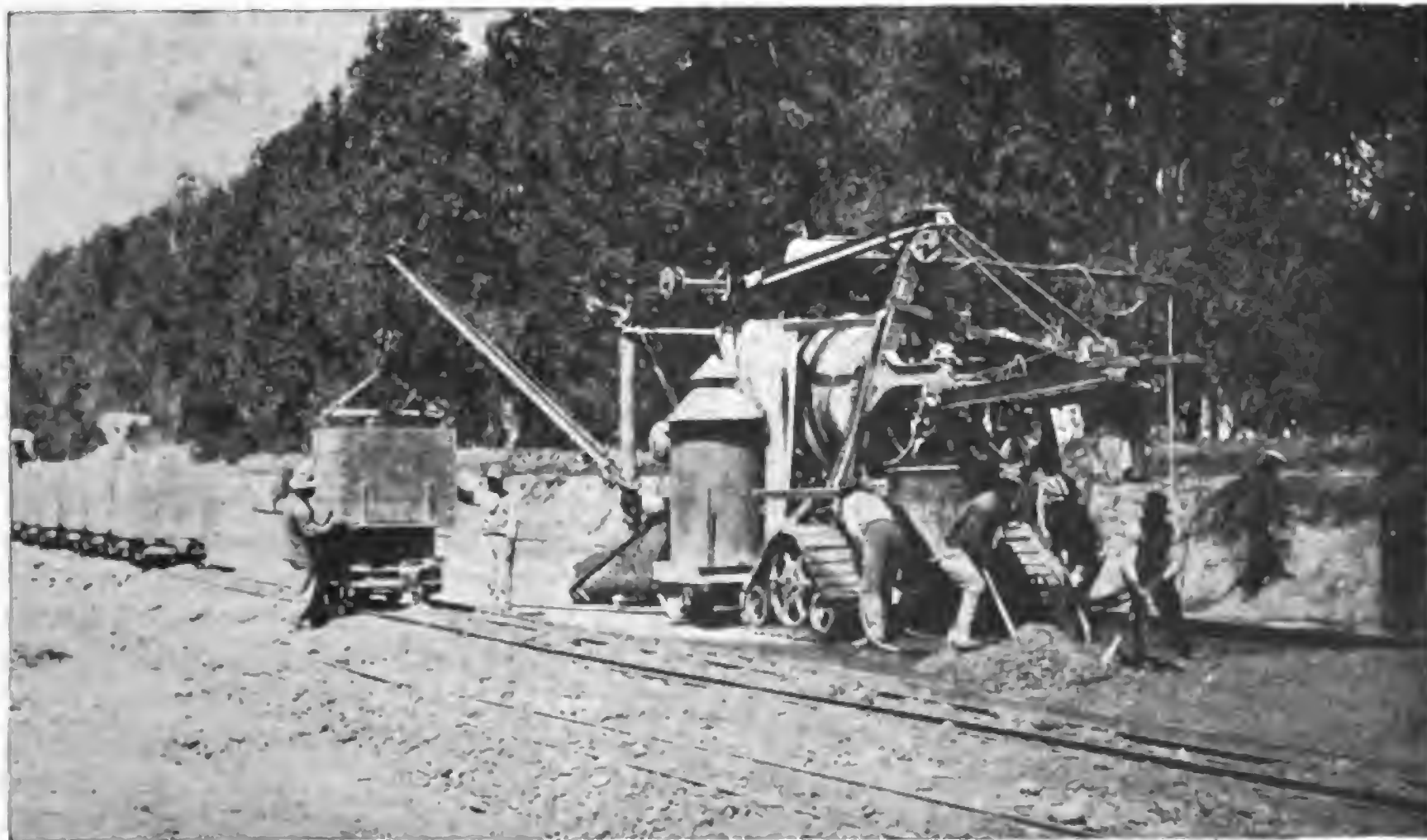
General View of Aggregate Proportioning Plant, El Centro-Calexico Concrete Road Work, Imperial County, Cal.—This Modern Adjunct to Successful Highway Building Has Transformed a Desert Into a Garden.

season is practically the entire year and the soil is of wonderful fertility, being silt hundreds of feet deep, brought down by the Colorado river when it discharged into the sea then covering the district. At all times the Colorado river carries a

July or August. Surrounded by mountains, and depressed below sea level from two feet at Calexico to 187 feet at Calipatria, Imperial Valley brings fruits and vegetables to maturity so early that they reach market ahead of produce from other centers.

Earth roads soon become nothing but dust, as the silt, fine as flour, is churned up by traffic, and were it not for the unique system of maintenance employed, these roads would soon be practically impassable. The roads were laid out very wide, and ridges have been thrown up along the center and fences so that one side can be flooded with water from irrigation ditches while the other is being used. After irrigation the water is allowed to evaporate, and the road is thoroughly dragged, allowed to bake hard and thrown open to traffic. But at best these roads soon become rough and dusty, so that the completion of the concrete is an event much desired. The present construction is being financed by part of the proceeds of a county bond issue of \$1,500,000 which was voted in 1919.

At Heber, six miles from El Centro, the contractor has located his materials yard for the construction of the El Cen-



One of the Two Smith Mixers on the Imperial County, Cal., Concrete Road System—Efficient Time and Labor-Saving Machinery Has Done Much to Make Possible the Building of This Highway.

tro-Calexico road, which is the first link to be built. It is nearly 10 miles long. Other sections covered by the present contract are the Brawley-Calipatria and the Imperial-Holtville roads. When the



On the Unpaved Roads of Imperial County It Was Necessary to Flood One Side at a Time.

state has completed the paving now contemplated, practically all the towns of the valley will be joined by concrete roads, and we will have paved roads to San Diego, Yuma and Los Angeles.

Both fine and coarse aggregates are delivered f. o. b. the railroad point nearest the work by the county from pits and quarries operated by its own forces. These materials are secured outside of the valley proper, as throughout its entire length and breadth there is not one stone which has not been shipped in. Aggregates are handled by a Byers auto crane from the cars to overhead loading bins from which they flow by gravity into batch boxes on industrial cars, which are spotted below. Flat steel gates operated by wooden levers pivoted on lengths of gas pipe control the discharge from the bins. Both mixers are operated from this loading plant.

Trains of 12 to 16 Koppel cars, each carrying materials for two three-sack batches of 1:2:4 concrete, are hauled to mixer No. 1 by six-ton Plymouth gasoline locomotives. For a time, mixer No. 2 was supplied with materials by trucks which either hauled proportioned batches or dumped materials on the sub-grade, but it was planned to use industrial haul on most of the work. The two mixers are 14E, T. L. Smith machines, equipped with boom and bucket and a batch transfer whereby the box is lifted from the car truck as the skip descends. The average output for an eight-hour day has been about 500 lineal feet of 16-foot slab for each machine.

Water for mixing and curing the con-

crete and sprinkling the sub-grade is taken from irrigation canals. Because the Colorado river carries so much silt in suspension, a settling basin has been provided at each pump. These basins are

about 35 feet wide by 150 feet long. Water enters at one end from the canal and is pumped out the other end by a four by six-inch Worthington triplex plunger pump driven by a 10-horsepower Fairbanks-Morse, type Z, gasoline engine. The maximum length of pipe line has been three miles, through which sufficient water has been delivered at the mixer under about 50 pounds pressure by a head at the pump of 170 pounds. The pipe was formerly used as a gas main, and is two inches in inside diameter. For wetting the sub-grade before fine grading is done, a portable pump unit is used to take water from the nearest canal. Because of the lack of rain and the character of

This Worthington Triplex Pump and Settling Basin Supply Ample Water for Concrete Paving Operations.



soil, after rough grading has been done, the sub-grade must be compacted by pounding before it can be shaped for the concrete.

Proper curing of the slab is of unusual importance, because of the high temperatures reached during the summer

months. As soon as the concrete has been finished by the Lakewood tamping machine and has begun to harden, it is wet by a mist from atomizing sprays. These special nozzles are fastened three to four feet apart in a section of pipe about 50 feet long that is placed near the edge of the slab. Wet burlap is placed over the concrete as it hardens and earth dykes for ponding are prepared as soon as the concrete is strong enough. The pavement is kept under water for 10 days.

Peterson, Dillon & Patterson of Heber, Cal., is the contractor for the 30 miles now under contract, and the work is being executed under the supervision of the Imperial County Highway commission, which is composed of L. F. Shaw of Holtville as chairman, W. J. Best of Calexico and the writer as secretary.

For one unacquainted with Imperial Valley, it is hard to realize the transformation that has come about. Approximately 585,000 acres are included in the watered area of the Imperial irrigation district, and the county now has a population of over 43,000 instead of the handful of desert dwellers of 20 years ago. The great strides forward can be well illustrated by a few figures. During February and March 35 car loads of head lettuce were shipped out daily from the valley. At the town of Brawley alone 300 car loads of cantaloupes have been loaded in a single day at the height of the season, and during the summer 9000 car

loads leave the valley. In 1920 5,648,099 pounds of butter were shipped from the many creameries. Since all these products must first be moved over the highways, one can understand why Imperial Valley must go forward with paving with all speed possible.

LET MAGNETO ALONE.

That small unit, called the high-tension magneto, placed at the right side of the engine and driven from the timing gear set, that plays such an important part in the successful operation of the engine, needs care of the most intelligent kind. Its function is so important that when it gets out of order the engine stops and will not go again until the magneto is repaired. Truck drivers should, therefore, obey the rules of the magneto manufacturer to the letter and should not tinker or experiment with it.

The ordinary magneto requires about three drops of fine machine oil once in 30 days and this is sufficient to keep the

bearings lubricated for this period, with the truck working from 10 to 20 hours a day. When oiling the magneto do not stick the oil can spout into the oil well and let the oil run while you are telling a story.

Too much oil is just as apt to injure the magneto coils of the armature as too little oil will injure the bearings. A drop or two is sufficient or just enough to keep the ball bearings of the armature lubricated.

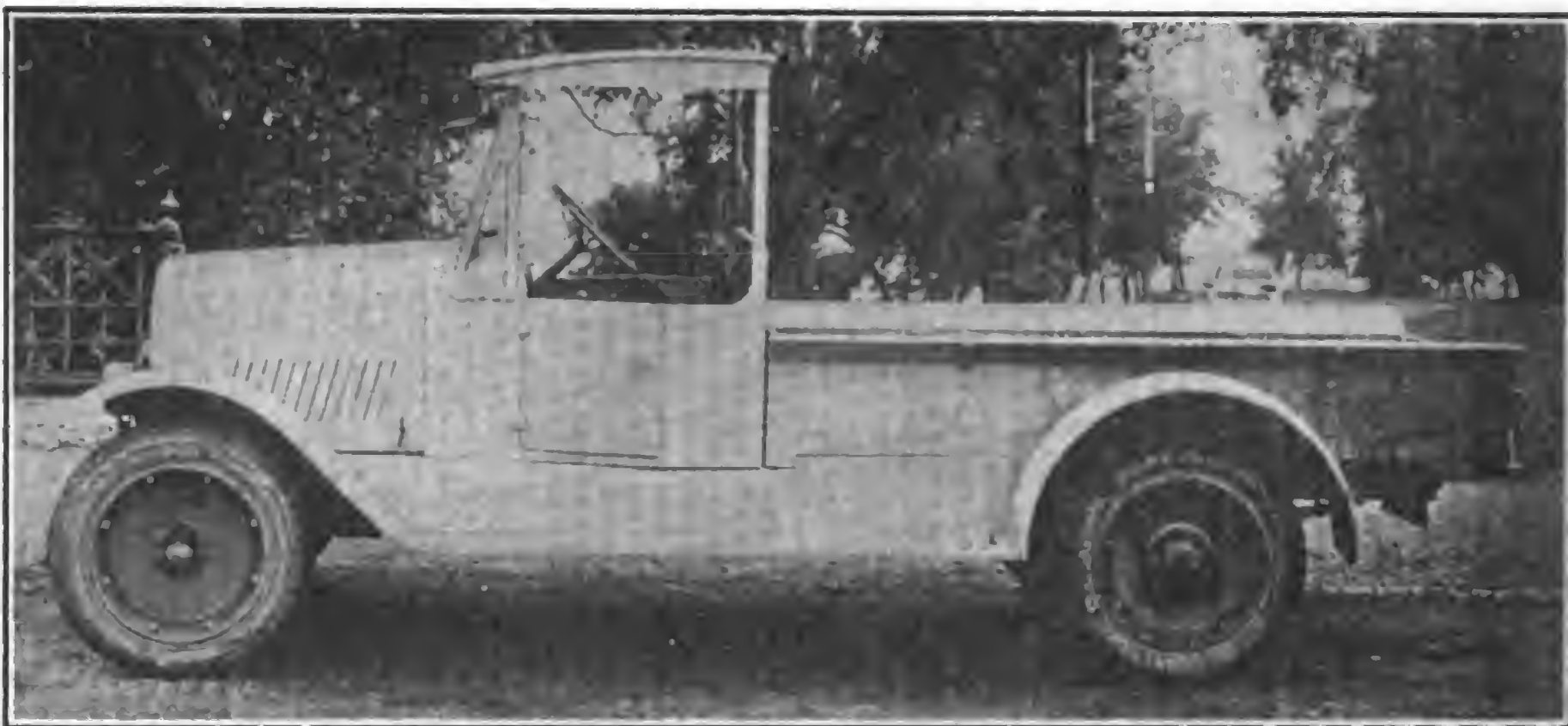
Truck drivers should make an effort to attend one of the evening school classes which are teaching automobile mechanics. Nearly every town of any size is very willing to establish such a class in connection with evening schools and the cost in connection with such a course is

usually very small, probably not more than one dollar for the season.

Study of the instruction book which is given with every new truck purchased will give the truck driver a fund of information that will be invaluable to him in caring for the truck provided he studies it faithfully. Asking more experienced operators questions on points he may not understand will often give him a clearer understanding of the mechanical units and their uses.

Magneto repairs should be handled by experts, either factory or local, and only the best local repairer should be retained. Such work as cleaning the breaker points can be easily done by the truck driver, care being exercised that the breaker point setting is not disturbed.

Super-Six Speed Truck Finds Favor



It Is Claimed That This Power Hauler Will Develop a Speed of 53 Miles an Hour—It Has an Unusually Quick Pick-Up and Can Be Throttled Down to One Mile an Hour.

LARRABEE-DEYO MOTOR TRUCK CO., Binghamton, N. Y., states that it has started production on a new one-ton, six-cylinder truck and that this job has been on the road for the past three months receiving the hardest kind of test treatment so that before the truck was actually announced to the trade the company would be in a position to guarantee that the engineering principles involved were correct and that the truck would perform properly in the hands of customers.

Orders are being taken and contracts signed with reputable dealers to handle this Super Six speed truck in all unoccupied territory and the company expects a rush of orders in all parts of the country as soon as the dealers are able to get sample trucks for demonstration.

THE new truck is all truck from end to end and will, it is claimed, develop a speed of 53 miles an hour. It has an exceedingly quick pick up and can be throttled down to approximately one mile an hour on high speed. The gasoline tank, having a capacity of 14 gallons, is located under the driver's seat, while the cowl and seat riser are cast integral. The frame is inswept to allow for a short turning radius, permitting the truck to be easily turned in narrow streets.

On a recent trip to Buffalo and return, over both improved and dirt roads and all kinds of grades, the job averaged 26.23 miles an hour; its gasoline consumption was one gallon to 13.4 miles, while the oil

used was a little bit under one pint and only two quarts of water were required.

Before building this job present dealers were canvassed and they were asked what they would like to have incorporated in a one-ton speed outfit and the present truck is the result of their suggestions. The new truck has more than come up to the expectations of those who have seen and operated the new truck and the engineers are well pleased with it. Deliveries are to commence in September.

SPECIFICATIONS, LARRABEE-DEYO SUPER-SIX SPEED TRUCK.

Engine — Continental, Six-Cylinder,
Model 7-R.
Bore and Stroke—3½x4½ Inches.

Clutch—Brown-Lipe.
Transmission—Brown-Lipe.
Springs—54-Inch Rear, 38-Inch Front.
Steering Gear—Gemmer.
Radiators—Fedders.
Battery—Exide.
Ignition—American Bosch.
Wheelbase—138 Inches.
Loading Space—Nine Feet.
Wheels—Disc Steel.
Tires—Goodyear Truck Cord, 34 by Five-Inch.

Front and Rear Axles—Salsbury.
Prices f. o. b. Binghamton, N. Y.
Complete with electric lights and starter, windshield, cab and curtains and express body.....\$1990
Complete with express body, canopy top, curtains and windshield..... 2050
Complete with windshield, cab and curtains, stake body..... 2050
Chassis with windshield, seat riser and cushions 1925

THE HUBODOMETER.

While it may seem superfluous to the average truck operator, the hubodometer, which is considered regular equipment by many truck manufacturers, fills a place in truck operation which is little considered by the truck owner. Dealing with the subject of tires, for instance, attention may be called to the advantages gained by checking the mileage made by the truck against the guarantee offered by the manufacturers of tires. By strict attention to the readings of the hubodometer the operator is able to distinguish with a degree of accuracy what tires are giving him the service that he expects and those that are not. Similarly, it may also be used in checking the service life of other units, as well as giving a very clear idea as to how the truck as a whole is performing with relation to the number of miles travelled.

In using a form of accounting system whereby the cost of operation is figured, the hubodometer is invaluable and should be a part of the equipment of

every truck that is used in haulage service. Only by keeping accurate accounts can the owner know whether his truck is making or losing money for him and the use of a hubodometer plays a very important part in this item alone.

RIM TROUBLE.

When a rim with a tire is mounted on the wheel, it often happens that the rim cannot be moved into place, remaining partly on and partly off. A slight springing of the rim is all that is needed and this may be done by placing the head of a jack against the hub of the wheel and the base of the jack on the protruding portion of the rim. When thus sprung a little a hammer blow will slide the rim over the edge of the wheel. In most cases of this kind the mere operation of the jack will force the rim over the wheel.

Mud is bad for brake gearing, the points of which do not work freely when coated with it. Therefore clean the brake gear as well as the car.

BEARING ADJUSTMENTS.

The life of an engine depends largely upon its bearings. One ruined bearing will soon cause the wreck of the entire engine and still some drivers, knowing this fact, will continue to drive an engine with a loose bearing until it finally burns or hammers out, or a connecting rod crashes through the side of the crank case, forcibly reminding the driver that extensive repairs are necessary.

A loose engine bearing will produce a distinct knock. Sometimes it is necessary only to tighten the bolts which retain the bearing caps in place and again, in case of a badly worn bearing, it may be necessary to remove one or more of the liners or shims placed between the upper and lower halves of the bearing, allowing the cap to be tightened snugly, making proper contact with the bearing surface.

Unless the driver is experienced in adjusting bearings, it is best for him not to attempt this work. It is a simple procedure to the initiated, but difficult for the novice.

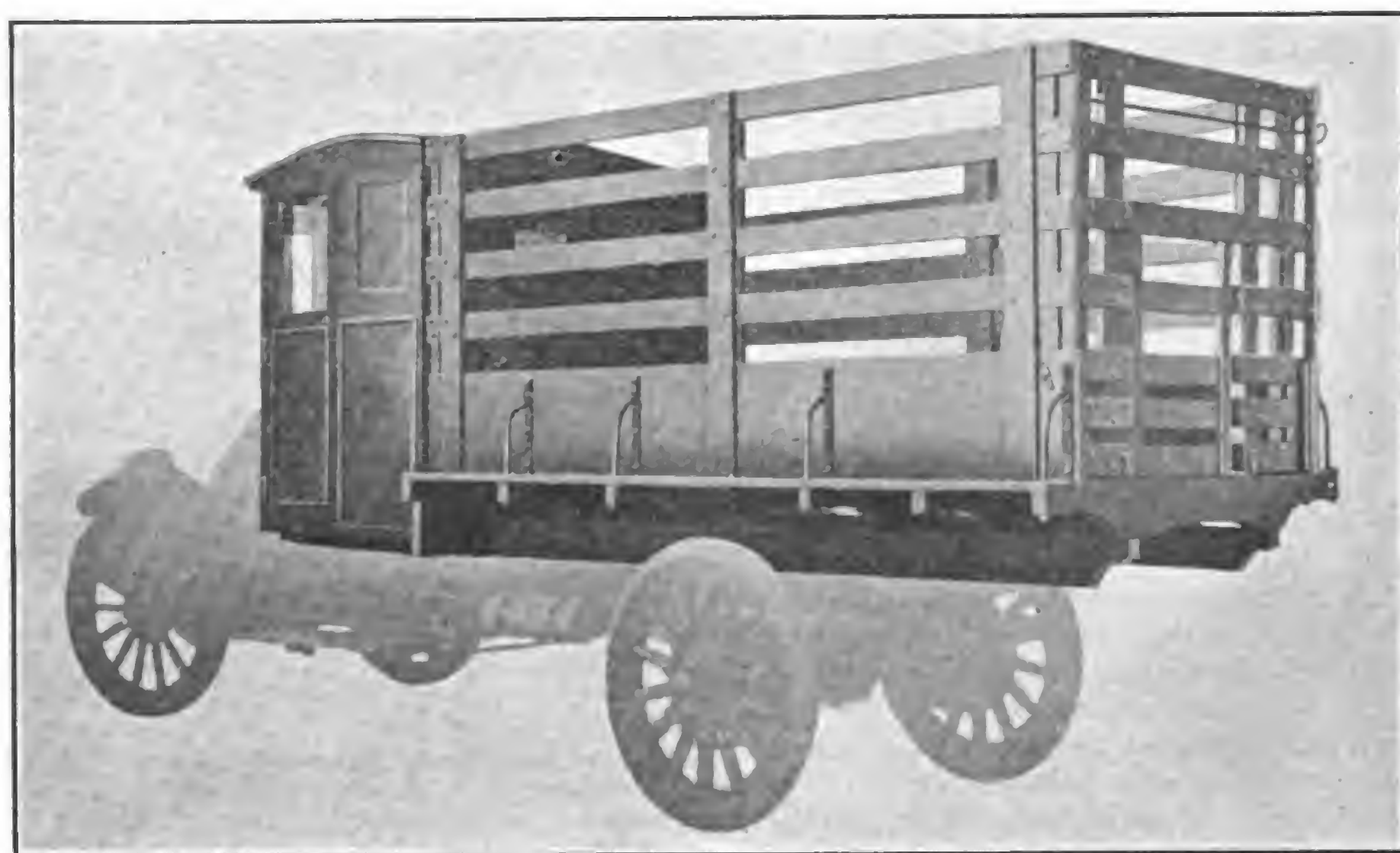
Builds Ford Commercial Bodies

FORMER MANUFACTURER OF HORSE-DRAWN VEHICLES NOW
BUILDING BODIES AND CABS FOR MODEL T AND TON TRUCK
—BUSINESS HAS ASUMED LARGE PROPORTIONS

SPAULDING MANUFACTURING CO., Grinnell, Ia., for about 50 years manufactured horse-drawn vehicles, later entering the body-building business, designing bodies and cabs especially for Ford ton trucks and Model T cars. This business has grown to such proportions that the company has decided to make bodies exclusively.

A slogan which the company uses gives an idea of its aim in body building: "Spaulding Better Bodies Make Better Trucks Sell Better."

That this slogan is justified is attested by the manner in which Spaulding bodies are made. Nothing but the best materials enter into their construction, this applying to both wood and iron stock.



This Illustration Gives an Idea of the Very Thorough Workmanship and Design of the "Spaulding Better Bodies."

BODIES and cabs for every purpose for which the Ford Model T or Ford ton truck may be used are comprised in the line and it includes both open express as well as enclosed types fitted for various usages. Standard stake types having wide platforms and grain-tight bodies, designed for the grain farmer, are featured strong and these

may be obtained with extra sides, which add materially to the carrying capacity of the truck. Stock racks for the Ford ton truck are featured, having slatted sides of a sufficient height to prevent stock from harm while in transit on the road.

Universal Bodies.

Spaulding bodies are adaptable to truck

chassis other than the Ford by means of special adjustable sills and wheel housings which meet the requirements of any standard truck. The Universal body is constructed with heavy oak or ash sills, hardened tongue and grooved flooring, clear gum box board panels, angle grain strips, full length running boards, painted green inside and out. All wood material is kiln dried in special condensing temperature-regulated dry kilns so that the body continues to stay in a grain-tight condition.

Mother Hubbard and All-Weather Cabs.

The Mother Hubbard cab is equipped with detachable windows and doors, but is made in such a manner that it drops down over the express seat furnished on the truck chassis by the manufacturer, which offers a distinct saving to the dealers. This cab is very roomy and comfortable and the doors and windows are removable, making an open cab if desired. It is painted the regular Spaulding Brewster green.

The Spaulding All-Weather cab is furnished either in the curtained or all-weather style and is especially adapted to the Reo Model F truck. Two doors are provided which make for the comfort for the driver in winter and they can be removed easily when warm weather arrives. This model is painted Reo khaki or Brewster green as desired.

CHANGING GIANT CORD TIRES.

The changing of large pneumatic truck tires, though seemingly a very difficult task, may be materially facilitated by the observance of a few very simple rules of procedure which, of course, apply especially to the rim and tire equipment of pneumatic tired trucks.

The first step in removing the tire and rim from the wheel is to jack up the wheel until there is ample clearance between the tire and the road. Remove all nuts and clamps, loosen the rim by a quick jerk, or by tapping with a hammer if there is a tendency to stick. When the tire and rim are ready to remove, turn the wheel so that the tire valve is at the bottom; then, grasping the tire and rim

with both hands at points just below the level of the hub, lift and pull the rim away from the top, at the same time watching the valve carefully to note that it does not bind on the felloe band.

Removing the tire and rim in this manner requires very little lifting and eliminates the danger of injuring the valve or tube at the valve base.

To disengage the tire from the rim, lay the tire on the level ground, the locking ring side up. Remove the valve plunger to insure the complete escape of the air and push the valve stem back inside of the rim. Remove the locking and side rings, loosen the flap all around, then, standing inside of the rim, lift the tire straight up off the rim.

When ready to replace the tire on the rim again, reverse the operations of detaching. See that the tube flap is in place

and, with the valve stem pushed back even with the base of the flap, slip the tire carefully over the rim, being sure that the base of the valve stem is directly opposite the rim valve hole. Press the tire down on the rim all around by treading on the bead, apply the side and locking rings, draw out the valve stem to the proper position and inflate.

In applying the rim and tire to the wheel, engage the valve stem with the felloe at a point level with the hub, push the rim firmly against the felloe and slowly turn the tire, rim and wheel until the valve is at the highest point. The rim will then drop into place on the felloe except at the bottom, where it can be pushed on by the foot. Direct lifting is by this method entirely eliminated and the applying of even the largest pneumatics is made a one-man job.

HERE and THERE

Commandeering Plan Includes 10 Trucks

Vehicles Designated as Standard by
War Department Subject to
Emergency Call.

WASHINGTON, D. C., Oct. 13.—All motor vehicles of 10 different types, designated as "standard for the United States army," would be subject to be commandeered by the War Department in time of national emergency under a plan which has recently been worked out by officers of the motor transport service.

The manufacturing plants of firms making these types of vehicles would also be taken over by the government, under the suggested plan. Army officers charged with this work state that recommendations would probably be made to Congress authorizing the federal government to take the necessary action in time of national need.

Those responsible for the selections are emphatic in their declarations that the list does not attempt to include all the good motor vehicles manufactured in the United States. They freely admit the merits of other machines and insist that the fact that a car has been omitted in no wise constitutes a slur upon that particular make.

Two considerations have been decisive in making the selections, they assert. First, the suitability of the vehicle to the particular needs of the army service, and second, the ability of plants manufacturing those vehicles to produce on a large scale under war-time demand.

Only one type of motorcycle is authorized.

FWD IN CHINA.

CANTON, CHINA, Sept. 15.—China is coming to the fore front in the use of motor trucks and motor transportation. This belief is borne out by the recent establishment of a motor bus line in Canton, China, a city where this type of motor-driven vehicle has never before been known to have been operated.

The bus line is operating 15 FWD trucks, manufactured by the Four-Wheel Drive Auto Co. of Clintonville, Wis. The trucks are equipped with passenger bodies of a Chinese make and each truck hauls a trailer which is similarly equipped. One unit, consisting of a truck and trailer, has a seating capacity of 70 persons.

Canton is a city of over 1,000,000 population and, until only a year or two ago

when reconstruction work was begun, there were only 15,000 feet of road in that city sufficiently wide to accommodate wheeled traffic. That stretch of road was

TRUCK RULES.

1. Truck tires have a load limit.
2. Heavy overloads kills tires.
3. Distribute loads evenly.
4. Each tire should bear its share of weight.
5. Overspeeding affects tires the same as overloading.
6. Know, don't guess, your inflation pressures.
7. Tires are limited in shock absorbing power.
8. Careful driving reduces tire costs.
9. Check your wheel alignment.
10. Misaligned wheels are costly.
11. Use chains only when necessary.
12. Watch the fender clearance of your tires.

along the water front. In 1919 work was started to tear down the old city wall, build a modern road in its place, and remodel the city streets on a more modern plan. With this work recently completed the new motor bus service was put into operation.

Automobile Insurance Called Too High

N. A. C. C. in Special Conference
Has Sub-Committees Make
Study of Subject.

NEW YORK, Oct. 15.—At the offices of the National Automobile Chamber of Commerce in this city, last week, a thorough study was given the automobile insurance situation by sub-committees representing the Manufacturers' Insurance committee and the underwriters. In attendance representing the Manufacturers' committee were: Stewart McDonald (Moon), E. E. Staub (Hudson), Alfred Reeves, general manager, N. A. C. C.; J. S. Marvin, assistant general manager, N. A. C. C. From the Underwriters' conference were: Edmund Ely, chairman of the National Rate committee; C. S. Timberlake, chairman of the National Theft committee, and W. P. Young, secretary and general manager of the National Automobile Underwriters' conference.

Mr. Marvin stated that while this particular conference reports to the full committee for definite action, the meeting is part of the present activities of underwriters and manufacturers in seeking reduced costs of insurance to the individual users of cars and trucks. The theft of cars is continuing at an alarming rate. This and the laxity in the enforcement of laws which should be sufficient to check these thefts, occupied a considerable part of the discussion which was otherwise devoted to technical details on the possibility of a more simplified schedule of grouping automobiles and trucks.

Other plans of the chamber include further discussion of the question.



Canton, China, Has a Motor Bus Line That Is Said to Have Solved the Transportation Problem in a Very Satisfactory Way.

Larger Distribution Hinges on Better Banking Facilities Say Experts

Motor Truck Financing Methods and Development of New Markets Discussed at October Meeting of National Automobile Chamber of Commerce.

NEW YORK, Oct. 12.—With the tendency of post-war commerce toward a more extensive use of highway transportation than ever before the truck manufacturing members of the National Automobile Chamber of Commerce discussed at the last quarterly meeting on Oct. 7 the ways and means of bringing about a wider acceptance of motor truck paper in the interests of larger distribution.

J. H. Shale, vice president of the Bankers' Commercial Security Corporation of New York, sounded the keynote of the conference with an address on the various phases of motor truck financing that are important for the future growth of the industry. Curtis C. Cooper, president of the General Motors Acceptance Corporation, also addressed the conference, outlining the changing attitude of bankers.

In entering the field of urban and inter-urban transportation the manufacturers feel that they have in the motor bus a product that will stabilize in a large measure existing conditions brought about by the shifting of population and increased cost of operation. In order that they may intelligently approach the problems of this new field, Walter Jackson, street railway consultant, was asked to emphasize the salient points developed by his recent trip abroad. Mr. Jackson has made an extensive study of the allocation of bus and trolley services, and his address was especially timely.

CONTINUED PROGRESS IN AUTOMOTIVE INDUSTRY.

NEW YORK, Oct. 15.—In August, normally the lowest seasonal level in the automotive industry, sales of parts and equipment to car and truck manufacturers moved forward more than one per cent. beyond the July figure.

This steady progress is the significant feature of the monthly survey of

conditions in the automotive industry made public by the Motor and Accessory Manufacturers' association.

Purchasers of parts, units and equipment by automobile passenger car and

REDUCE GAS RESERVE.

WASHINGTON, D. C., Oct. 12.—The supply of gasoline on hand in the United States was reduced by nearly 100,000,000 gallons and production decreased at the rate of 37,225 gallons a day during July, according to figures completed by the bureau of mines.

On July 1 there were on hand 750,644,450 gallons of gasoline. On July 31 this amount had been reduced 684,236,695. During the month 419,641,815 gallons were produced by 299 petroleum refineries having a daily capacity of 1,721,550 barrels of oil. Eleven plants suspended operations during the month.

The average daily production of gasoline during July was 13,536,833 gallons, a decrease from June of 807,980 gallons a day, but an increase of 196,542 gallons a day over the same month last year.

motor truck manufacturers from 300 parts and accessory manufacturers show an increase of 1.31 per cent. In July the increase was 1.68 per cent. and in June the curve had shown a decrease of 15.19 per cent.

During August the automotive industry also showed betterment in two other fundamental respects, the total past due accounts decreasing 17.06 per cent. and the total of notes outstanding dropping 5.30 per cent.

The percentage changes for the last eight months follow:

COMPARATIVE FIGURES FOR 1921.

Month	*Pct. Change	**Pct. Change	***Pct. Change
February	66.15 Inc.	17.07 Dec.	39.08 Inc.
March	93.30 Inc.	16.57 Dec.	16.38 Dec.
April	32.93 Inc.	4.49 Dec.	5.94 Inc.
May	00.13 Inc.	15.64 Dec.	16.77 Inc.
June	15.19 Dec.	4.79 Inc.	10.37 Dec.
July	1.68 Inc.	10.79 Inc.	7.90 Dec.
August	1.31 Inc.	17.06 Dec.	5.30 Dec.

*Purchases of parts, units, equipment, etc., by automobile passenger car and motor truck makers from 300 parts and accessory manufacturers by months—per cent. change.

**Totals of past due accounts reported—per cent. change.

***Totals of notes outstanding—per cent. change.

RICHARDSON MADE ASSISTANT GENERAL MANAGER.

LOS ANGELES, CAL., Oct. 10.—Announcement of the promotion of Forrest P. Richardson, purchasing agent of the Leach-Biltwell Motor Car Co. of Los Angeles to assistant general manager of that company, has been made by M. A. Leach, president and general manager.

Mr. Richardson, who also is a director of the Leach Co., has been connected with the concern for more than two years and, with Mr. Leach was one of the founders of the enterprise, which now is a \$5,000,000 corporation and equipped to produce approximately 1200 cars a year. The company now is in full production, having several months' orders ahead.

FISK AND FEDERAL DECIDE TO CONSOLIDATE.

SPRINGFIELD, MASS., Oct. 15.—Stockholders of the Fisk Rubber Co. and the Federal Rubber Co. in a recent meeting here voted to consolidate the two companies and also to take over the Nineget Co., a fabric manufacturing subsidiary. The consolidation will take the name of the Fisk Rubber Co. It also was voted to issue \$10,000,000 of bonds.



New Plant in Which the Wizard Four-Pull Tractor Is Made at Stockton, Cal., by the Kroyer Motor Co.—This Occupies a 30-Acre Site and Is Up-to-Date in Every Particular.

Camp Devens Being Dismantled by Order of War Department

Property to Be Disposed of Includes Great Fleet of Expensive Motor Trucks Which Have Been Standing Exposed at Camp for Several Months.

CAMP DEVENS, MASS., Oct. 15.—This huge cantonment—the training ground on which so many New England men prepared for battle during the World War—is no longer an army post.

By order of the War Department it is to be abandoned, and the process of its dismantlement is already well under way, though the task is such a huge one that it will probably be months before the process is completed.

The troops here have received their orders and are carrying them out. These orders provide that the 36th Infantry, which came here from Fort Snelling during the late summer of 1918, is to go to New York state where, as a skeleton organization, it will be distributed among several army posts, including Fort Jay and probably Fort Niagara.

Millions of dollars' worth of property is to be disposed of. This property consists of about every conceivable article from motor trucks to caskets.

During the recent Citizens Military training camp thousands of visitors saw the long lines of motor trucks that are stored here and it was plain that these vehicles haven't turned a wheel for months.

Many of them stand in the open—that is, they are covered by a roof—but there are no walls around them, so that they have been at the mercy of wind and rain for months.

The writer inquired about the motor trucks months ago and was informed by officers of the Quartermaster Corps that most of those that were visible belonged to the Massachusetts Highway commission and that the commission had permission to store the trucks at Devens as long as it cared to keep them there.

John N. Cole, commissioner of public works, said that it is true that the state has some motor trucks at Devens. The trucks, he said, were purchased from the state by the federal government at a price not exceeding 10 per cent. of the original cost of the trucks.

He said that originally there were between 50 and 60 trucks at Devens which belonged to the state, but as the state found that these trucks are too heavy for the kind of work it wished done they are gradually being exchanged for smaller trucks until there are not more than 30 of

FIGHT BUSSES.

LORAIN, O., Oct. 21.—The fight between motor busses and street railways has gripped this city and a special committee has been busily engaged in work considering a revision of the jitney bus ordinance which will be reported at the next meeting of the council.

The street car company contends that the busses have caused a heavy deficit in receipts. It is asked in the ordinance that the busses run to the city limits the same as the street cars, instead of half-way.

Busses here charge a five-cent fare, with three cents for school children. The car company has a flat five-cent rate. Popular opinion is decidedly in favor of the busses and it is currently stated that a movement is on foot to motorize all city transportation, although this report is not considered as entirely authentic.

the state's trucks at this cantonment, he believes.

"While it is true that the trucks have no walls around them to shelter them from the wind and weather," said Mr. Cole, "they are being cared for sufficiently. When Camp Devens is abandoned we

will find another place to put such of the trucks as have not been disposed of."

What is to become of the trucks that belong to the federal government is not known here nor at corps headquarters as yet. In the course of the inventory that is being taken it will be decided how many of these trucks are "surplus," and these will be reported as such to the War Department. Then it will be up to Washington to decide what is to be done with them. And this will hold true in the disposition of all other property at this camp.

The general feeling among officers is that the surplus trucks owned by the federal government as are still serviceable will be distributed to nearby army posts for army use, while those that are in poorer condition will be sold at auction.

It is unlikely that any of the vast quantity of property at the camp will be ready for either shipment, sale or storage before the middle of November.

There is almost everything imaginable: Horses, mules, shoes, razors, hats, wagons, tents, blankets, typewriters, desks, chairs, beds, motor trucks, belts, socks, stoves, shirts, machinery, medical and surgical supplies.

AUTHORIZE ADDITIONAL CAPITAL.

DETROIT, MICH., Oct. 12.—At a special meeting held recently at which more than 85 per cent. of the outstanding stock was represented, the stockholders of the Denby Motor Truck Co. authorized the issuance of \$300,000 first mortgage bonds and \$650,000 first preferred stock. These securities will not be offered at public sale.

This increase in capital places the Denby Co. in a very satisfactory financial position and will enable it to secure its full share of business as truck buying revives. The company reports a very active demand on its new $\frac{3}{4}$ -ton and $1\frac{1}{2}$ -ton models, which are especially adapted for the haulage of light and medium loads.

OFFER UNIQUE REWARD.

CHICAGO, Oct. 12.—The Jaffe Radiator Co. of Chicago, Ill., manufacturer of Ford replacement radiators, has made the very unique offer of \$100 reward to anyone who can prove that the core of the Jaffe radiator can be damaged by freezing.



Home of the Former Briscoe Car and Truck Now Owned and Controlled by Earl Motors, Inc.—This Mammoth Organization Is Headed by Clarence A. Earl, One of the Best Known Men in the Entire Industry.

To Head Agricultural Implement Group

**George B. Bell Named for Post.
Has Wide Experience in
Equipment Field.**

CHICAGO, Oct. 13.—Announcement has been made by the Department of Commerce that George B. Bell has been placed in charge of the Division of Agricultural Implements and Vehicles. Mr. Bell has been engaged in the farm equipment business for the past 20 years. For 17 years he was assistant manager of the export office of B. F. Avery & Sons, and for three years with Bateman & Co. in charge of its export trade.

The new division chief has had wide experience in the sale of all kinds of farm equipment, which especially fits him for the duties as outlined in Commerce Reports, Sept. 5 issue, by Secretary Hoover in the following statement:

"It is proposed to place information with regard to foreign trade before American business men in more intelligible and constructive form. Heretofore a vast amount of material which comes in from a staff of 600 foreign agents, including commercial attaches, consular officers, trade commissioners and special agents, has been presented in a daily mass of reports, unsystematized excepting for arrangement to some extent on a purely geographical basis.

"The Bureau of Foreign and Domestic Commerce is being reorganized on a commodity basis, the object of which is threefold:

"First, that specialists in the different great industrial divisions should be incorporated in the bureau for the purpose of giving expert direction to these many foreign agents as to the investigations and services that will be of importance and most useful to their particular branch of industry.

"Second, that they may, by maintaining close communication with trade asso-

FAVOR ORGANIZATION.

NEW YORK, Oct. 12.—An important movement toward bringing about uniformity in the automobile and traffic regulations of the different states was started at a recent conference held at the Yale club at which Walter W. Law, Jr., president of the New York Tax commission, which took charge of the motor vehicle management of the state on July 1, presided. Seven neighboring states were represented by officials.

In the discussion it was admitted that motor regulations might be made more uniform so that, in crossing state lines, a motorist would not have to search out the laws of the state into which he was going in order to avoid arrest and fine. The sentiment was unanimous that a permanent organization among the officials should be effected and a second meeting was arranged for New Jersey at a later date.

ciations in different industries, keep in touch with the character of service, information and investigation needed in these industries.

"Third, that the material coming in may be edited and prepared in such a manner as to be of the most practicable service.

"The following divisions have so far been established: Iron and steel, lumber, industrial machinery, electrical equipment and supplies, food stuffs, automotive equipment, fuels, textiles, shoes and leather products, agricultural implements and vehicles, rubber products. Other divisions will enroll.

Uniform Laws Would Curb Truck Hazard

**Strict Enforcement of Scientific
Traffic Rules Urged by
D. C. Fenner.**

BOSTON, MASS., Oct. 13.—Motor truck transportation can be made far more safe by the adoption of uniform scientific traffic laws in all the states, and by stricter enforcement of the statutes, in the opinion of D. C. Fenner, chairman of the Motor Vehicle Conference committee and manager of the Public Works department of the International Motor Co., speaking before the New England Conference of State Highway Commissioners and Motor Vehicle Registrars. The Motor Vehicle Conference committee represents the automobile owner, manufacturer, dealer, parts and tire associations of the motor vehicle industry. The conference of commissioners was held in connection with the Annual Congress of the National Safety council.

Mr. Fenner stated that careful analysis of accidents in which motor trucks have figured has revealed the fact that the disasters have usually arisen from the excessive size, weight or speed of the vehicles; from overloading or from inadequate or defective equipment. Still other causes were reckless or incompetent operation, improper enforcement of the laws and conflicting traffic regulations as between states or the municipalities within the states.

After citing instances to illustrate the manner in which these causes of accidents have operated disastrously, he recommended to the highway commissioners and motor vehicle registrars that they lend their support to the movement which has been begun to bring about the general enactment and enforcement of uniform motor vehicle laws throughout the entire United States. In this connection he explained those provisions of the proposed uniform vehicle law which have a vital bearing on those factors, and showed how the adoption of the measures recommended would make for safety.

He concluded by emphasizing to public officials that motor transportation is an increasingly important medium of commerce, that its development is today only in its infancy, and that the wisest course for everyone to pursue is to develop sound and equitable regulations for rendering this new type of transportation safe and not measures for stifling its legitimate and vitally necessary growth.

MYERS RETURNS FROM EUROPE.

NEW YORK, Oct. 12.—Walter E. Myers, president of the Denman-Myers Cord Tire Co. of Cleveland, O., arrived in New York on the Empress of India on Sept. 29. Mr. Myers has been in Europe since Aug. 13, when he went to attend the Ecumenical conference in London.



This Unusual "Volator's View" of the New Rickenbacker Factory Was Taken by a Friend of America's Most Famous Airman.

LOS-GATOS SANTA CRUZ ROAD DEDICATED

Prominent Part in Opening Ceremony Taken by San Francisco Motor Car Dealers.

SAN FRANCISCO, CAL., Oct. 11.—The official opening of the new Santa Cruz highway, an event which means much to the automobilists of this vicinity in that it will afford motorists an all-year-round opportunity to visit this city by the sea, 79 miles distant, was recently celebrated and a gala day was made of the occasion. The chambers of commerce of the different cities along the line of parade vied with each other to make the day one long to be remembered by motor-dom.

The members of the San Francisco Motor Car Dealers' association were the invited guests and upon them fell the honor of opening this new piece of highway. Fifty automobiles, filled with overseas men, comprised a part of the San Francisco party.

The Santa Cruz and Santa Clara chambers of commerce made the trip to San Francisco in 200 automobiles accompanied by a band and escorted the local party down to Santa Cruz, where suitable entertainment was provided.

INCORPORATION DEMUND SALES & SERVICE CO.

INDIANAPOLIS, IND., Oct. 14.—The Demund Sales & Service Co. has been incorporated here and will be the national distributor for the W. E. Brobst Co., Noblesville, Ind., manufacturer of the Brobst equalizer. The officers are as follows:

President and general manager, J. T. DeMund; vice president, William E. Brobst, Jr.; secretary and treasurer, Dr. H. T. Wagner; directors, the foregoing and Harry A. Stern, L. L. Beals, A. L. Millington, E. J. Smith, F. S. Campbell.

The new concern is located at 1110 North Meridian street.

RIGHT TRUCK IN THE RIGHT PLACE.

ALMA, MICH., Oct. 10.—"General business conditions during the past year have caused business executives to scan as never before every item of outlay in its minutia," according to Col. Frank E. Smith, first vice president and general manager of the Republic Truck Sales Corporation.

"A source of frequent loss in business," says Col. Smith, "is a leak in the delivery system. Since trucks became common and were found to be more profitable than horses, it has often been taken for granted that any truck would do the work needed, at a profit, without taking into consideration the size of the load, the distance to be hauled and the condition of the roads.

TO OPERATE 26 BUSSES.

AKRON, O., Oct. 10.—Several new busses will be put in service as auxiliaries to the present street car system on Dec. 1, N. O. T. officials announced Tuesday. Others will be added as traffic demands and the tentative plans contemplate the installation of 12 such vehicles when the scheme is completed.

A description of the new bus is as follows: Seating capacity, 25; all-steel body, design similar in arrangement to new type of Peter Witt cars; pay-as-you enter plan; one-man operation; closed type; equipped with screens and curtains; emergency door in rear, controlled by chauffeur; body maroon, leather upholstery; linoleum-covered floor; long, easy riding springs; cost, \$7500.

Routes for the first three busses are being determined from a traffic check.

"All these factors enter into the selection of the proper truck for the hauling to be done; so does the question of initial investment. One reason we have produced the Republic Rapid Transit is because certain businesses, where the capital is limited, require a truck that does not cost much to buy, is cheap to operate and yet is so well built that it will last for years."

Although it is customary at this time of year to expect a falling off in the number of orders received, the demand for the Rapid Transit is stated to have caused a steadily increasing production schedule at the Republic factory.

GASOLINE TAX EFFECTIVE IN TEN STATES

No Other Fees Eliminated and New Assessment Adds Approximately \$6,000,000.

NEW YORK, Oct. 15.—Ten new states, bringing the total to 14, have added taxes on gasoline consumption during the 1921 sessions of their legislatures, according to Harry Meixell, secretary of the Motor Vehicle Conference committee, which is composed of representatives from the American Automobile association, Motor and Accessory Manufacturers' association, National Automobile Chamber of Commerce, National Automobile Dealers' association, Rubber Association of America, and the Trailer Manufacturers' Association of America.

When the present year 1921 began the laws of four states imposed taxes upon gasoline used in the propulsion of motor vehicles. Colorado, one cent per gallon; Kentucky, one cent per gallon; New Mexico, two cents per gallon; Oregon, one cent per gallon.

Today after the legislatures of 42 states have convened and adjourned their 1921 sessions 10 more states have been added to the list: Arizona, one cent per gallon; Arkansas, one cent per gallon; Connecticut, one cent per gallon; Florida, one cent per gallon; Georgia, one cent per gallon; Montana, one cent per gallon; North Carolina, one cent per gallon; Pennsylvania, one cent per gallon; South Dakota, one cent per gallon; Washington, one cent per gallon.

Bills aiming to impose gasoline taxes were also considered by the legislatures of nine other states, namely, California, Illinois, Indiana, Maine, Michigan, Nevada, Ohio, Tennessee and Texas.

It is said that present indications point toward the adoption of a similar assessment by many other states.



The Long Established Firm of H. McFarlane & Co., Body Builder, Has Just Completed This New Building Which Is Among the Finest in Chicago.

Better Times After Disarmament Conference Predicted

Is the Opinion of Expert Member of Foreign Trade Committee, National Automobile Chamber of Commerce, Who Has Just Returned from Abroad.

NEW YORK, Oct. 15.—Better times than the world has ever known will come from the disarmament conference, in the opinion of Peter Steenstrup, member of the Foreign Trade committee of the National Automobile Chamber of Commerce and vice president of the General Motor Export Co., who has just returned from Europe.

The bargaining tariff feature of the Fordney bill and longer banking credits based on careful information are immediate needs for improving conditions in the foreign market.

It will be some months, Mr. Steenstrup reports, before any marked increase may be noted in the sales of American cars abroad due to conditions which can be remedied only by the general rehabilitation of the entire economic fabric.

Germany Working Hard.

"Germany is coming back strong," according to this foreign trade authority. The country is in the hands of capable financiers and everywhere one sees people at work.

England has adjusted her labor troubles and there seems to be high hope for the settlement of the Irish condition.

Russia is modifying her form of government with gradual improvement in her economic condition.

The high duties in France and Spain are obstacles to American trade there, which can probably be remedied when the bargaining tariff becomes effective.

Open Publicity Essential.

"The question of disarmament," said Mr. Steenstrup, "is fundamental to the

entire economic condition. We should have open publicity at the coming conference. The rank and file of the people

ADVISES PRICE CUTS.

DETROIT, MICH., Oct. 12.

—Henry Ford, accompanied by Mr. and Mrs. Edsel Ford, and C. W. Avery, arrived here unexpectedly, and after spending a few hours at the Ford body plant and mill the party went on to Negaunee to inspect the plant and timber holdings.

"Business will get back to normal only when prices are cut sufficiently," Mr. Ford said. "After the war we found loafers and non-producers in our Detroit plant. We weeded them out and are now able to sell cars cheaper than before the war."

in all countries will never stand for continuing present expenditures on armament if the facts are brought fully to light.

"The release of the burden of taxes for

battleships and other war material will mean billions of dollars available for the purchase of raw materials and transport which the world, and particularly Europe, needs badly at the present time. Relief of the war burden will pour into civil life a new stimulant, bringing into being a new world condition better than we have realized before.

"Europe is realizing the economic advantages of motor transportation and, when the burden of war taxes is lifted, she will be able to develop in this direction. In Germany, for instance, one sees practically no automobiles today. There are not even enough taxis at the railroad stations. In a three hours' ride in a certain German city having 75,000 people I did not see a single automobile.

Gasoline Cost Hurts British Trade.

"The cost of gasoline at 60 cents a gallon is one of the factors hurting the trade in England. While there I counted on the road to Plymouth 100 motor cars passing in an hour and in the same period 115 motorcycles and 125 bicycles.

"Lack of parking facilities in the cities is also an obstacle. The horsepower tax in England, which is one pound per horsepower, is another hindrance. Nevertheless, the advantage of American cars will become increasingly apparent and the need for such high taxes will pass away if the economic strain of war costs is relieved.

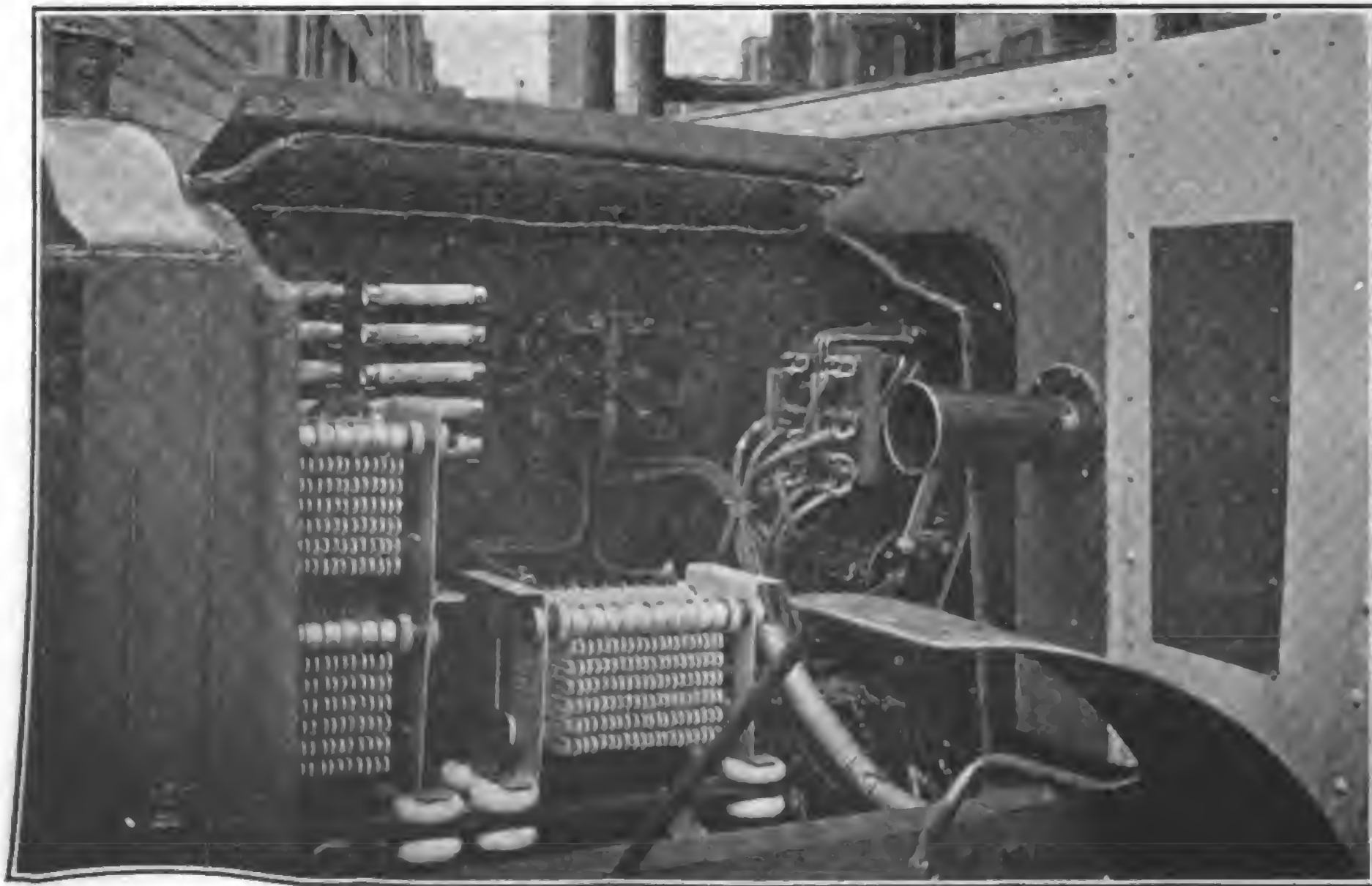
Advantages of Bargaining Tariff.

"Spain and France have had virtually prohibitive tariffs against the American cars with the added factor of the difference in exchange working against the product from the United States. The bargaining feature if enacted as proposed in the Fordney tariff bill will permit the President to give lower American tariff rates to products from other countries, in cases where they lower their tariff wall on certain of our products, and should prove of great assistance in these and other countries which have high protective walls.

"The process of European recovery is going to be gradual, though sure, and there is immediate need for better banking information and better financing for the present day trade. If we are to sell abroad now, we must be in a position to give long-term credits. In order to do this, it is essential that American banks be in a position to furnish accurate information on the financial status of concerns abroad."

APPOINTED SUPERVISOR FOR MAXWELL.

DETROIT, MICH., Oct. 12.—H. J. Edwards has been appointed supervisor of the Detroit district for the Maxwell Motor Sales Corporation and the Chalmers Motor Car Co. Mr. Edwards has had a wide experience in sales organization work. He was connected for many years with the Union Carbide & Carbon Co., both as sales manager and as general manager of several of their subsidiaries, notably the Prest-O-Lite Co. Prior to that he was eastern manager for the Moline Plow Co., where he became well known to the implement trade.



Packard Trolley Bus Motor Control Units Mounted Under Hood at Rear of False Radiator, Enabling Air to Cool Units While Operating.

Relates the Advantages of Modern Highway Transportation

Secretary Fenn of National Motor Truck Committee Says World Is Just Awakening to Manifold Benefits of Motor Vehicle Haulage.

NEW YORK, Oct. 10.—“The world is just awakening to the manifold advantages of highway transportation,” declared F. W. Fenn, secretary of the National Motor Truck committee, National Automobile Chamber of Commerce, today, in discussing the present trend in transportation. “This is manifested in a striking manner in the reports which reach our office from all parts of the country on the decline of the horse, the back bone of the transportation fabric for many years. Registered stallions in Wisconsin decreased from 2437 in 1918 to 1688 in 1920. In the State of Michigan they decreased from 1288 in 1918 to 1068 in 1919. Ohio had 965,000 horses in 1917 and 862,000 in 1919. It is little surprising therefore to discover that the board of health’s horse census, which will be released shortly, will show that there are today in New York City approximately 10,614 less horses and 1784 fewer stables than in 1919. Only recently 160 horses were sold in Portland, Ore., for chicken feed.

“Just last month a prominent business house in the city with large haulage demands had a survey made of their transportation routes. Out of this study it developed that the cost per mile to operate a two-horse team of 2000 pounds capacity was 48 cents. On the other hand, the cost per mile of operating an electric truck of the same capacity is only 20 cents, a clear saving of 28 cents. As the horse outfit covered 400 miles during the month under observation there would have been a saving of \$112 on this one team alone during the same period with the use of an electric.

“The big problem today on the streets of New York is to keep the traffic moving. The element of time has become the pivotal point in the study of operation costs. In the opinion of W. D. Williamson, an engineering expert, traffic congestion can be traced invariably to slow-moving, horse-drawn vehicles which retard the fast motor traffic; the horse-drawn vehicle will by the very nature of things therefore be as rarely seen as the bullock wagon. Reductions in general will follow through the opportunity to reduce stables, which are always more or less unsanitary no matter how carefully supervised; to get by congested traffic quicker; to turn around in crowded thoroughfares better; and to back up to the loading platform in a more efficient manner. Weather conditions also affect the working efficiency of horses; in one week last summer 776 horses died from the heat.

“Today the farmers in New Jersey, Long Island and the southern portion of New York, upon whose shoulders rests the great responsibility of providing food

for New York City, are in greater need of the motor truck than ever before. The prices obtained for many classes of products by the farmer depend to a large extent upon his ability to place them on the

MUST POSSESS TITLE.

LANSING, MICH., Oct. 12.—Automobile and truck owners have until July 1, next year, to obtain a certificate of title to their cars, notwithstanding reports which had been sent out to the effect that the titles must be obtained by Oct. 1.

An owner may sell, trade or dispose of his car without the certificate until July 1, 1922, without reference to the secretary of state’s office, unless he has already obtained the certificate of title. If he has, he must report the sale, and conform to all of the provisions of the law, but otherwise he may do with his car as he pleases.

market in good condition at the right time. The ordinary methods of marketing farm products do not take promptness into consideration. This is a situation that must be overcome and the motor truck seems to be the most satisfactory means of bringing this about.

“The Bureau of Crop Estimates of the United States Department of Agriculture discovered, after an exhaustive series of experiments with horse and motor-drawn vehicles, that the motor-drawn vehicles travelled 25 per cent. longer distance; made 183 per cent. more round trips; carried 48 per cent. more corn, 50 per cent. more wheat and 83 per cent. more cotton. This work was done at 45, 50 and 37 per cent. of the ton-mile cost of wagon-hauled corn, wheat and cotton respectively.

“The day of the power farmer is at hand, as will be evidenced by trips to any of the representative farms in this country. It is to him that we must turn in answer to the city’s cry for greater production. Food will continue to be the biggest factor in world economics for many years to come; the golden age of ample food for a minimum of effort has passed. Yesterday it was production at any cost; ‘food, food,’ was one of the great war cries. But today every farmer fully realizes that it must be the lowest possible cost of production.

HOISTS USEFUL IN DELIVERING COAL.

DETROIT, MICH., Oct. 15.—Standard Truck Co. is showing a new type of elevated body which it has developed for city coal delivery and is meeting with ready sale to coal dealers operating within city limits. Very often it is necessary to chute coal across a sidewalk or track or where the narrowness of the street prevents backing the truck to the curbing.

In certain cities it is not allowed to dump the load in the street, and, therefore, a device of this kind must be employed to dump the load direct on to the property, or into the cellars or coal rooms.

The mechanism is operated by a horizontal hydraulic hoist, which elevates the load to its extreme height in approximately one minute’s time. The device is operated very easily from the driver’s seat.

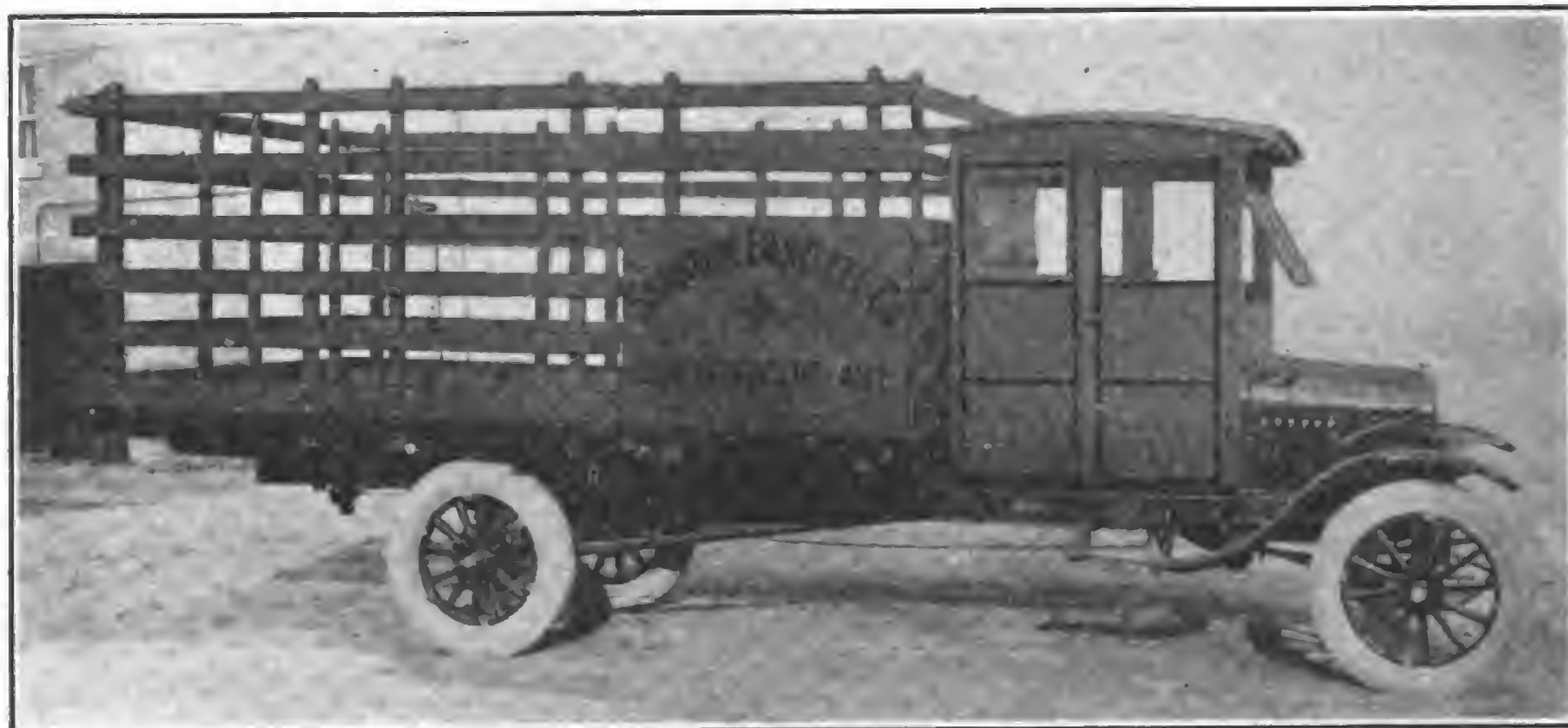


New Type of Elevating Body Offered by Standard Motor Truck Co. Has Been Especially Developed for City Coal Delivery.

AUTO HEAD LIGHT TESTING STATIONS PLANNED

Bureau Officials Believe Will Soon Be Adopted by Entire Country.

WASHINGTON, D. C., Oct. 15.—The initiative now being taken by the State of Ohio to test automobile head lights may



Columbia Slip-On Frame Body Equipment for Ford One-Ton Truck Makes Business-Like Appearance.

eventually be followed by every community in the nation, according to a prediction of the Bureau of Standards, which is now standardizing equipment for Ohio and California.

"There will be a time in the near future when each city of any size will have an automobile head light testing station," bureau officials say. They are taking an active part in the work of regulating head lights and making them safe for pedestrians and drivers.

The prediction is made that before many months policemen will be saying to drivers, "come with me to the head light testing station"

Much attention has been paid in the past to the properties of the lenses, and these are fairly well regulated. There is a lack of knowledge, however, of the proper adjustment of the lenses which the Bureau of Standard Engineers believes is just as important. The suggested head light testing stations would be educational and preventative as well as disciplinary.

EFFECTIVE METHOD OF MOTOR CAR IDENTIFICATION.

NEW YORK, Oct. 10.—It is generally recognized that one of the most effective ways of identifying stolen automobiles and minimizing the danger of their being stolen in the first place would be the general adoption of a method of numbering engines which would make it impossible to change the numbers without leaving indications that a change had been made.

Replies to a letter from the S. A. E. Standards department soliciting advice from automobile manufacturers on this problem indicated that the stamping of plain characters on several parts of the

engine and other units of the chassis is the most satisfactory way of guarding against having the numbers changed by automobile thieves. It is realized, however, that if a simple means of numbering cast iron or aluminum castings can be discovered which will make it difficult for the numbers to be changed, it would be a real solution to this problem. The suggestion has been made to the S. A. E. that a solution might be found by the casting of a special alloy block in the surface of that part of the engine casting which is to be numbered, the composition

of the alloy being such that it would be impossible to change the numbers by any simple means. The selections of such a material would depend, of course, upon its physical characteristics. Members are working on the matter.

TRADE BODY ORGANIZES.

SAN FRANCISCO, CAL., Oct. 13.—An association of automotive representatives has recently been formed here and is a branch of the San Francisco Automobile Trade association. Those eligible to join the organization must be manufacturers' agents selling only to jobbers of the West. The officers elected are as follows:

President, W. S. Greenfield; vice president, A. E. Mohrig; treasurer, J. H. Collins; board of governors, Paul Gardiner and Louis Graf; executive secretary, A. D. Ettel; counsel, Albert H. Elliott.

The members are the Allied Industries, Inc., W. C. Caldwell, J. H. Collins, Norman Cowan Co., Paul Gardiner, Thomas Gardiner, Graf Sales Co., Harold L. Hardwick, Hughson & Merton, Inc., C. N. & E. W. H. Jonas, A. E. Mohrig, Norton-Munter Co., George A. Sanborn, Jr., Sprake Sales Co., Inc., V. S. Walsh, Wright & Lacy, Louis J. Ziesel, all of San Francisco; J. C. Griffiths, Berkeley.

STACKHOUSE NAMED AS HEAD OF COMMITTEE

Which Will Hold Conference on Unemployment Conditions at Capital.

WASHINGTON, D. C., Oct. 9.—With the hope of ascertaining definite information regarding the extent of unemployment in various industries and of formulating some constructive program which will alleviate conditions, a committee representing the labor organizations, manufacturers in the affected lines, the general public and the government convened here recently. President W. H. Stackhouse, representing the farm operating equipment industry, was named as chairman of the sub-committee on emergency measures by the manufacturers. After an all-day conference that committee recommended a definite program designed to immediately increase employment in the factories of the country. It is anticipated that the sub-committee's proposals, which will be considered at a general meeting of the entire committee, will be adopted by that body. The proposals are reported to include recommendation for construction and repair work which is badly needed in many plants, manufacturing for stocks, reduction of working hours, reducing the number of hours a day and the number of days a week of the workers now employed, spreading the work over a larger number of employees. This may include reduction of work and the split week, measures which are already being successfully employed in a number of plants and decreasing unemployment in those sections.

KEEGIN MADE DISTRICT MANAGER FOR BALL CRANK CO.

CINCINNATI, O., Oct. 15.—The Cincinnati Ball Crank Co. has just announced the appointment of Curtis W. Keegin as district manager for Michigan.

Mr. Keegin, who was formerly with the Hyatt Roller Bearing Co. and Continental Motors Corporation, has a wide circle of acquaintances in the automotive trade who will wish him well in his new position.

PIERCE-ARROW REDUCES PRICES.

BUFFALO, N. Y., Oct. 12.—A substantial reduction in the prices of its truck and touring car models has been announced by George W. Mixer, president of the Pierce-Arrow Motor Car Co. The new prices of its truck models are: \$4850 for the five-ton size; \$4350 for the 3½-ton and \$3200 for the two-ton.

The new price of the standard seven-passenger touring car is \$6500 at the factory, the enclosed car prices being graded proportionately.

**NATIONAL SAFETY CONGRESS
MEETS IN BOSTON**

**More Uniform State Laws Is Re-
ported to Be Consensus of
Opinion.**

BOSTON, MASS., Oct. 12.—That more uniform state laws are required between states and covering all of the states of the Union seems to have been the consensus of opinion of the different state committee heads which met at the State House here recently. Motorists and truck drivers often pass from one state to another in a day's run and in so doing encounter a wide variety of state laws relating to traffic, head lights, registration, etc.

When the National Safety Congress was being arranged it was suggested to Secretary Lewis E. MacBrayne that it would be a good idea to interest New England motor officials and get them together for a conference.

About 100 officials and representatives of motor organizations attended the meeting and listened to a speech by Mr. Cole outlining the necessity of all of the officials getting together to thresh out their motor problems because motor transportation means so much to the life of New England.

Prediction was made by the speaker that eventually it would be necessary to employ inspectors to test motor vehicles before allowing them on the highways. Referring to fees, he felt that they must increase to keep pace with additional mileage, claiming that motor trucks were the most important part of our transportation system because of their flexibility.

Motor Vehicle Registrar Frank A. Goodwin of Massachusetts spoke on "Standardization of Motor Vehicle Accident Analysis."

Figures were submitted showing why it was necessary to discipline drivers by taking away the registration of cars as well as licenses. Forcing all applicants for licenses to take examinations, he contended, had cut down the number of accidents. His figures bore out his statement that discipline and education were having their effort on all drivers.

The subject of glaring head lights was treated by Professor William J. Drisco of the Massachusetts Institute of Technology. He stated that the present danger is from too little light rather than from glare, as motorists slow down when approaching dazzling head lights. He summarized the difficulty of meeting head light problems. Glare never has been defined as yet, he pointed out. It is a question of adaptation.

**MONEY INVESTED IN FARM
LANDS.**

WASHINGTON, D. C., Oct. 10.—At the close of 1920 there was invested in farm lands and buildings in the United States \$67,795,965,000. This compares with \$34,801,125,000 at the close of 1910. These figures, which have been compiled by the

**ROAD RULES IN FAR OFF
JAPAN.**

YANG YZEFRINTO, JAPAN, Oct. 1.—In land of the cherry blossom and the rickshaw the traffic rules for automobilists are just about as strict as they are in America.

According to the statement of a prominent Pacific coast steamship official, the tourist in Japan is greeted with a set of rules the same as he is in this country. It is stated that the following rules were printed in the English language in a Japanese paper recently.

At the rise of the hand of policeman, stop rapidly. Do not pass him or otherwise disrespect him.

When a passenger of the foot hove in sight, tootle the horn trumpet to him melodiously at first. If he still obstacles your passage, tootle him with vigor, and express by work of the mouth the warning "hi, hi."

Beware of the wandering horse that he shall not take fright as you pass him. Do not explode the exhaust box at him. Go soothingly by, or stop by the roadside until he pass away.

Give big space to the festive dog that make sport in the roadway. Avoid entanglement of dog with your wheel spokes.

Go soothingly on the grease-mud, as there lurk the skid demon. Press the brake of the foot as you roll around the corners to save collapse and tie-up.

Bureau of Census, show an increase of almost 100 per cent. in the past decade. The number of farms shows only a slight increase in the same period, the total at the close of 1910 being 6,361,502, as compared with 6,448,366 at the end of last year. The value per acre was \$70 in 1920, as against \$39 in the earlier year. The actual increase in the number of farms was 86,864, or 1.4 per cent., while the actual increase in the value was \$32,994,839,000, or 94.8 per cent. The census, however, was taken last year, when prices were greatly inflated.



**This Road Maintainer with a Single Operator Is Able to Keep Long Stretches of
Country Road in Good Condition.**

**GRAND CENTRAL PALACE
WILL HOUSE SHOW**

**Annual National Automobile Exhi-
bition to Be Held Jan. 7-14
in New York.**

NEW YORK, Oct. 8.—The Grand Central Palace will again be the scene of the annual national automobile show in New York City Jan. 7 to 14, 1922.

Decision was made earlier in the year to exhibit at Madison Square Garden if the Palace could not be secured. It was believed that the exhibition hall which has housed the New York automobile shows in recent years would be converted into office suites and an option was accordingly taken on the garden, with the understanding that the larger quarters of the palace would be utilized if available.

The national automobile show at Chicago will be held in the Coliseum and the First Regiment Armory Jan. 28 to Feb. 4, 1922. Both national shows are under the auspices of the National Automobile Chamber of Commerce.

**NEW ATTERBURY PRICES
ARE LOWER.**

BUFFALO, N. Y., Oct. 14.—The Atterbury Motor Car Co. has put into effect the following list prices on its different models:

Model 2OR, \$2475; 7CX, standard wheelbase, \$3175; 7CX, long wheelbase, \$3275; 7D, standard wheelbase, \$3975; 7D, long wheelbase, \$4075; 8E, standard wheelbase, \$4975; 8E, long wheelbase, \$5125.

All these models are equipped with cab seats.

**DECREASE IN PRICE OF
PEERLESS SPECIALTIES.**

COLUMBUS, O., Oct. 9.—A reduction of approximately 10 per cent. in the list prices of Peerless automobile paint, varnish and dressing specialties is announced by the Columbus Varnish Co.

Favorable Factors Indicate Great Industrial Improvement

Increase in Employment, Larger Output of Iron, Steel and Coal, Continued Activity in Textiles and Shoes, and Substantial Gain in Exports Reported.

NEW YORK, Oct. 14.—The outstanding factor stimulating business and industry in the last few weeks is the gain in cotton prices which followed upon the low forecast of the cotton crop. Other favorable factors indicating that business and industrial conditions are improving are: Increase in employment, larger output of pig iron, steel and coal, continued activity in the textile and the shoe industries, heavy movement of grains, continued railroad earnings, greater activity in building construction and substantial gain in the export trade.

This improvement in conditions is partly accounted for by the regular seasonal gain at this time of the year. However, even allowing for the seasonal element there are signs of a fundamental betterment.

A condensed summary of general business conditions by industries and districts follows:

Automobiles—Shipments of automobiles for the month of August increased two per cent. over shipments for July and 72 per cent. over shipments for August, 1920.

Automobile Tires—Domestic shipments of pneumatic tires increased 4.2 per cent. from June to July; inner tubes increased 11.4 per cent. and solid tires increased 11.6 per cent.

Motor and Accessories—The monthly survey made by the Motor & Accessory Manufacturers' association showed that total sales (of parts, units, equipment, etc.) increased 1.7 per cent. from June to July. Another encouraging factor was a decrease of 8 per cent. in totals of notes outstanding. However, the totals of past due accounts increased 10.8 per cent.

Oil—Production of crude petroleum showed a decrease of two-fifths of one per cent. from June to July. Consumption showed a decrease of 2.8 per cent.

Production of gasoline decreased 2.5 per cent., while consumption increased 2.8 per cent. from June to July.

Gasoline prices averaged 20.2 cents a gallon at the close of August, compared with 29.3 cents a gallon last January, a decline of 31 per cent.

Railroads—According to the Bureau of Railway Economics, the net operating income of 149 Class I railroads was \$50,724,000 in July, as against a deficit of \$5,196,000 in July, 1920. The total operating revenues decreased 13.5 per cent., whereas the total operating expenses decreased 29.4 per cent. compared with July, 1920, the net earnings being largely due to decreased operating costs.

The average car loadings per week for August increased 7.8 per cent. over July, and the number of idle cars decreased 13 per cent.

Iron and Steel—After a continuous decline for nine months, with the exception of the month of May, pig iron production for August advanced 10 per cent. over July, while the usual increase is only three per cent.

A GOOD LAW.

CHICAGO, ILL., Oct. 10.—

According to a recent law, no boy less than 18 years of age is permitted to drive an automobile or truck for hire in Illinois, and everyone who operates a motor vehicle for hire or compensation of any kind must have a chauffeur's license.

This law is to be strictly enforced as the result of a recent conference of those responsible for its passage and already the round-up of violators has commenced.

Steel ingot production for August advanced 41 per cent. over July. Although the unfilled orders of the United States Steel Corporation decreased 298,398 tons in August, this reduction is partly compensated for by the increased shipments of 100,000 tons in August over July. Plants were running at about 30 per cent. capacity in August and during the first half of September at about 33 per cent. capacity.

FRANKLIN ANNOUNCES NEW PRICES.

SYRACUSE, N. Y., Oct. 21.—In an announcement made to its dealers today the Franklin Automobile Co. puts into effect immediately prices on its product ranging from \$2350 for the touring car model to \$3350 for the sedan, with proportional adjustments on the five other types.

Production at the Franklin plant has been at normal capacity for months. This maintenance of volume manufacture and reductions in cost of material and labor, company officials say, makes possible the present price scale.

ELECT BURPEE SECRETARY.

NEW YORK, Oct. 12.—A general reduction in the size of automobile insurance policies, in most cases amounting to 50 per cent., was announced at the annual conference of the National Automobile Underwriters, held in the Commodore

hotel. It was explained that while policies issued last year would be continued, underwriters throughout the country were more cautious in renewing or issuing policies.

Several speakers spoke of policies issued a year ago as a "potential moral hazard," declaring that an unscrupulous automobile owner can risk the loss of his car under last year's policy knowing that he can recover more than the present sale price for it on his policy.

It was the consensus of opinion among those present that last year was unusual in the automobile insurance business because of the violent changes which took place and the resulting experiences of the companies, but the belief was expressed that the worst has been passed, and that with new restrictions imposed on automobile owners by legislation in many states there would be a continued improvement.

Some of those who addressed the gathering declared that the business could be stabilized through compelling policy holders to take greater interest in their cars, and a lengthy discussion ensued on a means to bring this about.

It was pointed out that owners were negligent in the care of appurtenances on their cars, and that not infrequently when filing claims for losses it was asserted that the part was recently purchased when it had been in use for some time and had deteriorated in value.

W. B. Burpee, secretary of the New Hampshire Insurance Co. of Manchester, N. H., was elected president of the conference to succeed George Bulkley of the Springfield Fire and Marine Insurance Co. of Springfield, Mass. John Marshall, Jr., of the Firemen's Fund Insurance Co. of San Francisco was chosen vice president and F. W. Day treasurer.

MANY WOMEN OPERATE FARMS.

WASHINGTON, D. C., Oct. 12.—Women are operating and working on many farms in the United States, according to a bulletin issued by the Bureau of Census. There are 261,553 women farmers, as against 6,448,366 men, and women owned 4.8 per cent. of the farm area in 1920. There are 7477 women farm operators in New York and 1103 in New Jersey. The percentage of farms conducted by women ranged from 1.9 in Nebraska to 7.2 in Rhode Island. In seven states the proportion was six per cent. or greater. These states were Rhode Island, Mississippi, New Hampshire, Connecticut, Alabama, Massachusetts and South Carolina.

REDUCE GRAMM-BERNSTEIN MODEL 10.

LIMA, O., Oct. 10.—The Gramm-Bernstein Motor Truck Co. has reduced the sales price of the Model 10 Gramm-Bernstein Pioneer speed truck from \$1495 to \$1365, according to notice received from W. R. Howell, sales promotion and advertising manager. This price reduction, says Mr. Howell, is made possible by an increase in production on this model and economies that have been effected.

Widespread Interest Aroused in National Vehicle Meeting

Convention of Great Importance to Every Manufacturer of Farm Equipment Held at Chicago Oct. 12-14—Programme of High Standard Is Presented.

CHICAGO, ILL., Oct. 12.—Although an extremely high standard has been maintained in the programmes of former National Implement and Vehicle association conventions, it is no reflection on the past meetings to state that never in the history of the association has there been a convention of greater importance to every manufacturer of farm equipment than that which is being held at the Congress hotel here the 12th, 13th and 14th of this month. A large advance registration testifies to the interest which the programme aroused.

Seldom have so many men of national and international reputation been brought together at any of these annual conferences, and at each business session there was presented information which was invaluable to all connected with the industry.

The opening session was convened by President Stackhouse promptly at 10 o'clock on Wednesday, Oct. 12. The afternoon sessions of each day commenced at 2 o'clock.

The programme follows:

FIRST DAY.

Wednesday, Oct. 12.

Opening Session—10 o'clock.

Call to order, President J. H. Stackhouse. Invocation, Rev. Edward J. Mullaly, C. S. P., pastor St. Mary's Church, Chicago. President's address, W. H. Stackhouse. Felicitations by auxiliary, R. R. Fauntleroy.

Announcements. Election of nominating committee. Appointments of committees—(a) resolutions; (b) necrology.

Address, William Black, chairman executive committee.

Report of Secretary, H. J. Sameit.

Afternoon Session—2 o'clock.

Address, Hon. H. C. Wallace, secretary of agriculture.

"What Next?" Hon. C. L. Glasgow, National Federation Implement and Vehicle Dealers' Associations.

"The Ideal Dealer," Grant Wright, secretary Eastern Federation of Dealers.

"Standardization," E. A. White, president American Society Agricultural Engineers.

BLOCK MOTOR THEFTS.

BALTIMORE, MD., Oct. 12.—A trial of the automobile title law in Maryland in one year has resulted in an almost complete elimination of motor car thefts in this state. Under the law no car can be registered and licensed until the title to it has been cleared. Once a car in the state has been recorded as the property of an individual, a license for it cannot be obtained by anyone else unless he can show that the title has properly passed to him.

SECOND DAY.

Thursday, Oct. 13.

Morning Session—10 o'clock.

"Can Farm Machinery Business Methods Be Better Conducted?" C. S. Brantingham, Emerson-Brantingham Co.

"Works Management Under Departmental Control System," L. R. Clausen, Deere & Co.

"Executive Management—Farm Machinery Industry," C. F. Huhlein, B. F. Avery & Sons.

"Business Outlook for 1922," William Black, chairman executive committee.

Afternoon Session—2 o'clock.

"The Benefits of the National Implement & Vehicle Association to Department

Membership," J. B. Bartholomew, Avery Co.

Address, Hon. Herbert Hoover, secretary of commerce.

Address, Hon. W. P. G. Harding, governor, federal reserve system.

"Corporation Between Business and Government," William H. Barr, president National Founders' association.

THIRD DAY.

Friday, Oct. 14.

Morning Session, 10 o'clock.

"The Implement Trade Press," E. J. Baker, Farm Implement News.

"Selling the Power Farming Idea and What It Means to the N. I. & V. A.," George E. Fuller, manager Power Farming Bureau.

"Publicity," Prof. A. L. Haecker, publicity manager, Silo & Barn Equipment Departments.

Address, Gen. W. W. Atterbury, vice president Pennsylvania railroad.

Afternoon Session, 2 o'clock.

"The Effect of the Economic Situation on the Purchasing Power of the Farmer," J. R. Howard, president American Farm Bureau Federation.

Executive business session—(a) report of necrology committee; (b) report of resolutions committee; (c) report of nominating committee; (d) remarks of newly elected officers; (e) remarks of retiring officers. Miscellaneous. Adjournment.

Evening.

Banquet, toastmaster, W. H. Stackhouse. Invocation, Rev. William Rhind Wedder- spoon, D. D., pastor St. James Methodist Episcopal Church, Chicago, Ill.

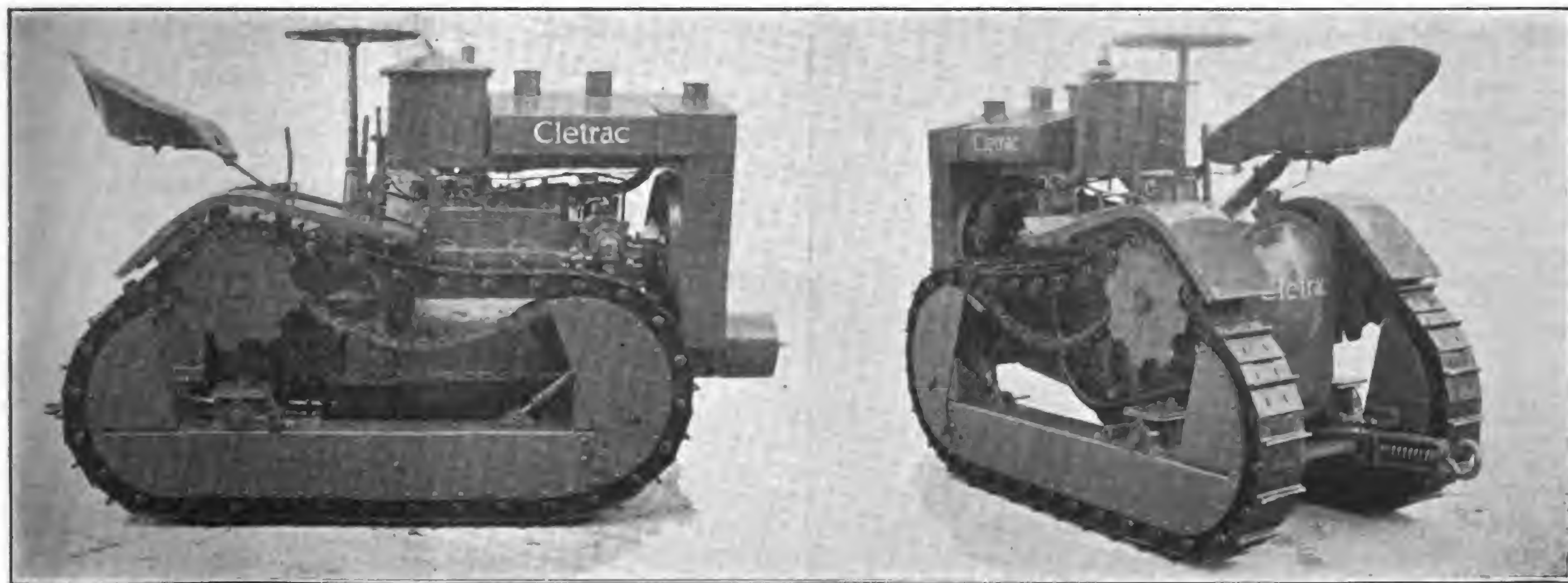
"Our Interests Abroad," Silas H. Strawn, Winston, Strawn & Snow, Chicago, Ill.

Editor's Note—A complete review of the different sessions of the convention will be found in the November issue of Motor Truck.

AVERILL JOINS COLE CO.

INDIANAPOLIS, IND., Oct. 10.—It has been announced that H. R. (Bert) Averill has become associated with the Cole Motor Car Co. in the capacity of special representative.

Mr. Averill has spent 20 odd years in the automotive industry and is unusually well known throughout the country. He was recently identified with the National Co. in an executive capacity and brings a wealth of practical knowledge to his new position gained by first-hand experience in the business.

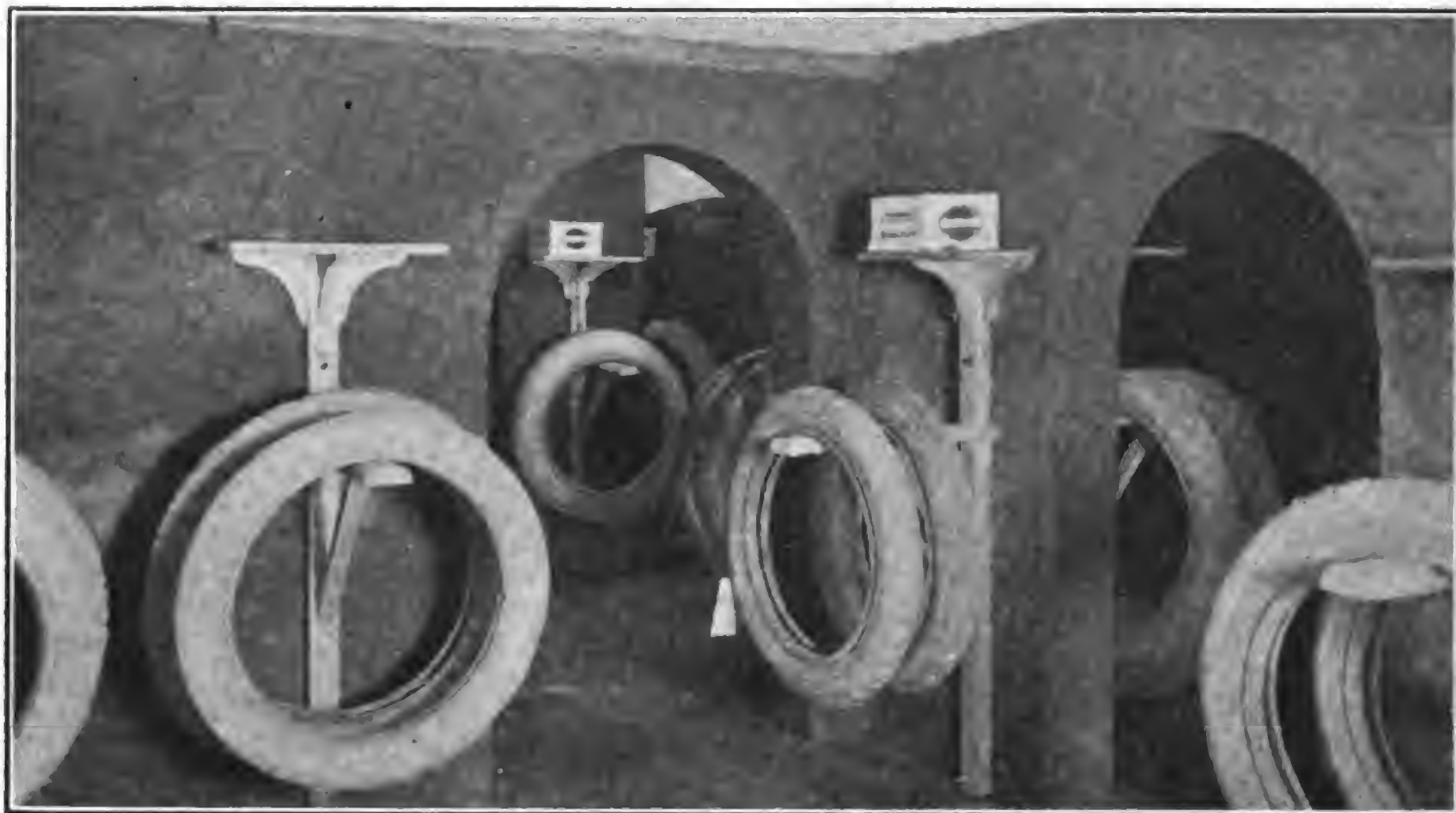


Side and Rear Views of Recently Designed Cletrac—Many New Features Incorporated and Price Has Been Lowered to Meet Present Conditions.

WARN PUBLIC AGAINST "OPTION CROOKS"

Frauds Perpetrated by Swindlers
Who Claim to Hold Options
on U. S. Cars.

DETROIT, MICH., Oct. 10.—Although a number of arrests have been made as a result of the fraudulent practise, the War Department reports that persons in various parts of the country are still being



The Tire Dealer in Holland Keeps His Expensive Tires in a Cool, Damp Cellar to Guard Against Deterioration—This Picture Shows One of the Sections of Such an Establishment.

victimised by individuals who pretend to be able to obtain Dodge Brothers motor cars from the government at bargain prices. The usual method, it is said, is to sell "options" on the cars, which are represented as being still in the original shipping crates, the war having ended before they were used. Once the "option" price is obtained, of course, the "agent" never reappears.

As the Dodge Brothers motor car was selected by the government as the official car of its class for service with the army during the world war, an enormous number of these cars were equipped for the American training camps and expeditionary forces. At the conclusion of the war the various branches of the army had fully 20,000 Dodge Brothers cars and almost immediately it was rumored that these cars were to be sold at ridiculously low figures by the government. It was a great opportunity for crooks. They went from town to town pretending that they had acquired options on large stocks of the cars, all in first class condition, and were prepared to sell these options for \$25 or \$30, sometimes more. The result was that both Dodge Brothers and the War Department were flooded with inquiries as to when and where the cars might be obtained. Warnings were issued, arrests were made and for a time the fraud died out.

Recently, however, it seems to have been renewed, as Dodge Brothers say they are constantly receiving letters and telegrams on the subject. The matter

was taken up with the military intelligence division of the War Department. A letter just received from this division by Dodge Brothers includes the following definite statement:

"I am informed by the director of sales of the War Department that no sales of new Dodge Brothers cars have been made by his office. He also informs me that arrests have recently been made in Philadelphia and New York by the Department of Justice of individuals who were fraudulently attempting to sell options on government cars."

As a matter of fact the great majority of Dodge Brothers cars acquired by the

army have been apportioned to various branches of the government service. A few auctions have been held at some of the army camps.

OROVILLE, CAL., AUTO TRADES ORGANIZE.

OROVILLE, CAL., Oct. 15.—Walter W. Biddick, field secretary for the California Automobile Trade association, has completed organizing the Oroville unit of the state-wide organization: The following officers were elected: President, Walter J. Sharkey; vice president, C. D. Records; treasurer, George Chaffen; secretary-manager, Robert Duncan.

BELL PRICES LOWERED.

OTTUMWA, IA., Oct. 15.—A reduction in the price of the complete line of Bell trucks has been announced by the Bell Truck Sales Corporation, sales division of the Iowa Motor Truck Co. The prices effective at once are:

	New Prices	Old Prices
Model M 1 ton.....	\$1495	\$1650
Model E, 1½ ton.....	2100	2250
Model O, 2½ ton.....	2550	2750

NON-FERROUS METALS TO BE STANDARDIZED

S. A. E. Committee Has Already
Submitted Specifications for
Consideration.

NEW YORK, Oct. 15.—The S. A. E. sub-division on Wrought Non-Ferrous Metal Alloys has submitted for consideration specifications covering brass forging rod, brass spring wire, naval brass or, as it is sometimes called, Tobin bronze tubing and phosphor bronze spring wire. If these specifications are adopted by the society, the S. A. E. non-ferrous metal specifications, of which there are now 25, will cover a sufficiently wide range to permit automotive vehicle designers to select standard specifications for practically any automotive purpose for which non-ferrous metals are used.

The specifications proposed by the engineers cover, in addition to the compositions in percentage specified, the physical properties, appearance, dimensional tolerances and general information of interest to users.

Desirable Plate Glass Practise.

In many cases body designers have specified plate glass window widths without regard to the commercial practise of manufacturing plate glass in even two-inch widths which has resulted in added cost which might easily have been avoided by a slight change in the window design. It is of course cheaper to use a 19¾-inch width in place of a 20¼-inch width, because the first size can be made from a 20-inch width, while the second size mould requires a 22-inch width, no intervening sizes being manufactured in commercial practise.

Realizing this situation a report has been formulated at the request of the passenger car body division of the S. A. E. which recommends that plate glass for automobile bodies shall be specified in even two-inch widths in accordance with commercial practise, if possible.

It is also recommended by the committee that the thickness of plate glass should be specified in fractions of an inch, the maximum variations of thickness of any single piece of glass not to be greater than 1/32 of an inch in order to prevent the glass from being tapered. The report also recommends that the thickness of plate glass for windshields shall be ¼ plus or minus 1/32-inch and the thickness of plate glass for closed body windows shall be 3/16 plus or minus 1/32-inch.

At the next meeting of the S. A. E. Screw Thread division a preliminary report for pressure gauge connections will be acted upon. The principal dimensions specified in the report are the diameter and the threads per inch of the air connection at the back of the instrument. The report has been approved by pressure gauge, as well as by passenger car and motor truck manufacturers. The general adoption of the recommendation will make pressure gauges interchangeable throughout the industry.

SHOWS ADVANTAGES OF RAPID TURNOVER

Booklet Issued by Chamber of Commerce Designed to Reduce Waste.

WASHINGTON, D. C., Oct. 10.—The advantages of rapid turnover in business are brought out vividly in an illustrated booklet just issued by the Domestic Distribution department of the Chamber of Commerce of the United States. This fundamental principle of merchandising is emphasized in connection with a suggested plan of stock control records designed to reduce waste and losses due to slow movement of goods.

The department calls attention to seven separate directions in which losses may occur when merchandise is not turned over as rapidly as it might be. These are an investment, interest, mark downs, salaries and wages, shelf and storage room, prestige and reputation and inefficiency. Taking up these elements of loss in detail the booklet says:

"Invested money is the source of profit which in turn depends upon the amount of goods in stock and upon the length of time which these goods are carried. It is evident that to double the turnover comes to the same thing as doubling the amount of stock without increasing the investment. Or, vice versa, one half as many turnovers results in doubling the amount of money invested for the same quantity of goods.

"Interest must be paid upon all borrowed money and most merchants are borrowers. If the turnover is reduced from a period of six months to one of three months the interest on a given loan is reduced in the same proportion.

"Mark downs are required for three principal reasons: 1, the goods have proved unsalable at the original mark up; 2, too many were bought and a change in the style or season has left some of them on the shelves; 3, with the result that they have been soiled, chipped, bent or defaced otherwise by frequent handling.

"Salaries and wages must be included because every operation in every establishment costs something. When an unprofitable operation is performed it represents a loss. Roughly these losses are due to:

"1, waste of time by management in reaching decisions as to when and what mark downs are to take place; 2, waste of time by sales force; 3, rewriting tickets; 4, rearranging goods for mark down sales.

"Shelf or storage room is a definite part of the expense of doing business; and that portion which is devoted to slow-selling merchandise is wasted.

"Prestige—'reputation'—for the high character or timeliness of merchandise is sought by most stores. There is a distinct waste measureable in dollars and cents when the reputation of an establishment is lowered by unstylish or shop-worn goods.

"Inefficiency always results in waste. The buyer whose judgment often is wrong

usually makes the mistakes from lack of knowledge as to the stock and the speed or slowness with which it is moving. Frequent mistakes cause uncertainty in the mind of the one who makes them and tend to worse errors as time goes on unless some measures are taken to make them improbable."

FOREST MONEY FOR ROADS.

BUTTE, MONT., Oct. 23.—During the present fiscal year, \$106,600 of national forest service money is being made available to the State of Montana for road construction, according to District Engineer Lautz of the forest service.

"There is just one method of reducing this waste to a minimum," says the booklet. "That is through records of purchases and sales which can be consulted at any moment; which will give a complete picture of the situation as it changes from week to week, from day to day, even from hour to hour if that be desirable; and which will supply the knowledge for immediate additional purchases, for mark downs or for any other change in handling the stock."

The booklet gives two graphs, one of which illustrates a form of control card record that has been successfully used.

"In a certain establishment the direct cost of this method of stock control," says the booklet, "has amounted to less than one per cent. of the selling price. Yet it has increased the turnover considerably in all of the departments.

CALIFORNIA TOURISTS MUST REGISTER.

LOS ANGELES, CAL., Oct. 20.—All tourists entering California by automobiles are required by law to register 24 hours after their arrival. There is no charge for this registration, which is good for three months.



This Picture Shows the Modern Way of Plowing a Rice Field—These Areas Are Unusually Wet and the Mud Is Deep, but American Tractor Meets the Emergency.

PREDICTS EXHAUSTION OF ROAD MONEY

Extensive Highways Programme Will Be Held Up Is Belief of Authorities.

PHILADELPHIA, PA., Oct. 13.—It seems quite certain that by the close of 1922 Pennsylvania will have entirely exhausted all funds available for road construction. Consequently the state's extensive construction programme must be abandoned—unless means are found to secure additional moneys. These additional funds may be procured if the people of Pennsylvania adopt a new constitution, and in that constitution include a provision which will enable the commonwealth to issue additional bonds for highway construction.

Under the terms of the present constitution the question of issuing bonds must be favorably passed upon by two legislatures and thereafter by the voters themselves. The Legislature of 1921 gave such a proposition its approval. The Legislature of 1923 must do likewise. The project cannot come before the people before the fall of 1924. The Legislature of 1925 must pass enabling legislation: hence not less than 2½ years must elapse before Pennsylvania can resume its huge programme, unless a new constitution is adopted with a provision enabling the commonwealth to issue bonds for road work.

This matter comes before the voters in the primary election of September, 1921. At this election they will say whether or not they desire to call a Constitutional convention and they will nominate delegates to this convention. If the vote is favorable delegates will be elected in November and the convention will convene early next year. The convention will finish its work and submit its findings to the people in November of 1922; and if the voters in that election approve the new constitution Pennsylvania can continue its road work. Unless this is done highway construction may be halted.

PRELIMINARY PLANS ARE ANNOUNCED

Automotive Engineers Hold Sessions Throughout Winter and Spring.

NEW YORK, Oct. 21.—A preliminary announcement can now be made of the plans of a number of the sections of the Society of Automotive Engineers for the coming months.

Subjects to be considered at Detroit include The Fuel Problem, a Discussion of Different Types of Carburetors in Use, Quality and Distribution of Gas, Piston Design, Cylinder Wall Surfaces from a Production Standpoint, Including a Discussion of the Advantages of Grinding Versus Draw Lapping, Lubrication systems, Particularly as to Proper Cylinder Wall Lubrication and a Study of the Methods for Reducing the Dilution of the Oil Film by Unburned Fuel, Research (A Continuation of the Work on This Subject That Was Started Last Season), Progress of Aeronautics (Commercial Aviation and Advances Made), Passenger Car Bodies (Work of Draftsmen and Designers), Production (The Possibilities of a Decreased Cost of Motor Car Building).

Although the dates have not been announced, the Mid-West section plans to hold a series of meetings given over to the discussion of thermo-dynamics, principles of carburetion, combustion phenomena and the fundamental losses in internal combustion engines.

The Metropolitan section on Sept. 15 gave a synopsis of the papers presented at the Fuel session of the society held in May.

Other subjects to be taken up at future meetings are the factors affecting the design of rear axles for trucks, in Novem-

11,000,000 TO DATE.

DETROIT, MICH., Oct. 12.

—Figures compiled by a group of experts show that since the beginning of the automobile industry some 25 years ago, the number of cars and trucks manufactured up to the first of 1921 has been approximately 11,775,000, of which more than 700,000 have been exported. About 9,000,000 are in use and 2,000,000 have been worn out, destroyed or abandoned.

ber; the commercial development of the air plane in December, and during the remainder of the year, chassis lubrication, power absorption from the flywheel to the road, car performance and how to obtain a definite factor representing it, and traffic problems, including that of parking space.

The Minneapolis section will have sessions during the season on manifold design and fuels, tractor wheels and traction, steam power for farm tractors, road-building machinery and engineering, power cultivators and tools, engine-to-ground power absorption in tractors, and tractor publicity and demonstrations. The engineering sessions will in most cases be preceded by informal talks on non-technical topics by prominent executives.

BUYS OVERLAND AGENCY.

MARSHALL, TEX., Oct. 24.—M. O. Wilson Son & Co., a newly organized concern composed of well-known business men, has purchased the Sanders-Overland Co. here, including garage, sales agency, accessory store and filling station.

PARTS AGENTS ORGANIZE ON WEST COAST

California Jobbers Form Association for Mutual Benefit in Trade.

SAN FRANCISCO, CAL., Oct. 15.—For purposes of mutual benefit, gaining recognition from parts manufacturers, as a distinct and definite branch of the automotive industry, and to establish a uniform basis upon which credit may be granted to the trade—such are the aims of the newly organized automotive association of San Francisco, which is styled the Automobile Parts Jobbers' association.

Membership in the organization is limited to those concerns only who are engaged in the jobbing of automobile, truck and tractor parts to the repair and garage trade. This will eliminate any factory representative from membership.

Frank Kreybill, Jr., of San Francisco has been elected chairman for the ensuing year, with Robert B. Young secretary and Bryce Howatson treasurer. Offices have been established in the Pacific building.

Members of the association as announced are as follows: Patterson Parts, Inc.; Triangle Parts Co., Bryce Howatson, Adams Gear Co., Automotive Parts Co., James Ingalls & Co., Motor Parts Sales Co., all of San Francisco.

STANDARD TRUCK REDUCES PRICES.

DETROIT, MICH., Oct. 15.—In line with recent reductions in material costs, the Standard Motor Truck Co., Detroit, Mich., has announced a substantial reduction in the price of all its models.

It is stated that this company was the first of the truck manufacturers in its field to announce a reduction from war time prices on Sept. 1, 1920.

The present reductions average 15 per cent. The revised prices f. o. b. Detroit now are:

Model 1-K, 1-1½ ton, solid tires....	\$1800
Model 1-K, 1-1½ ton, pneumatics 6" 2000	
Model 76, 2½-3 ton, solid tires....	2800
Model 66, 3½-4 ton, solid tires....	3600
Model 5-K, 5-7 ton, solid tires.....	4400

As a result of the reduction it is stated that sales have greatly improved and production has increased 25 per cent.

DATES FOR OAKLAND CAR SHOW.

OAKLAND, CAL., Oct. 10.—Manager Robert W. Martland of the Oakland automobile show announces that the dates for the fourth annual show have been set. It will be held in the Oakland Municipal Auditorium beginning Monday night, Jan. 16, 1922, and ending the following Sunday night, Jan. 22.

Plans are well under way and it is anticipated that this show will be greater than any of its predecessors.



The Trailer Is the Drawing Room Car of the Open Road—It Admits of the Campers Having Nearly Every Luxury of a Permanent Camp.

MORE WORK FOR MONEY AND
NO TAX INCREASE

Recommendation of Committee of
Representative Indiana
Farmers.

NOBLESVILLE, IND., Oct. 15.—More work for the money and no increase in taxes was the recommendation made by a committee of representative farmers, which held a meeting in this city recently to discuss road work in Hamilton county. Members of the board of county commissioners and Larkin Lee, county highway superintendent, also attended the conference.

A report made by Mr. Lee showed that \$84,000 had been collected in taxes in Hamilton county this year for road improvements, and nearly half of that amount has been spent for gravel and other material. The farmers said numerous complaints had been made to them that many men employed in road work were not earning their money. The farmers adopted a resolution urging the assistant highway superintendents to get more work out of their men.

Owing to a shortage of money not much road work will be done in Hamilton county this season.

NEW GRAMM-BERNSTEIN
PIONEER PRICES.

LIMA, O., Oct. 14.—The Gramm-Bernstein Motor Truck Co. of this city announced today the following prices, effective at once, on all the Gramm-Bernstein Pioneer models listed here:

Model	Capacity	Chassis Price	Price Extra Equip-ment	Price Completely Equipped
15	1½ ton I. G.	\$1900	\$150	\$2050
65	1½ ton W. G.	2500	225	2725
20	2 ton W. G.	2925	250	3175
25	2½ ton W. G.	3275	300	3575
30	3 ton W. G.	4225	300	4525
35	3½ ton W. G.	3995	380	4375
50	5 ton W. G.	4895	380	5275

The chassis price includes a seat with lazy back, oil side and tail lights, hand horn, jack, set of tools, Alemite lubrication system and, on models 25, 30, 35 and 50, steel wheels.

W. R. Howell is the advertising and sales promotion manager.

AUTO POSTAL SERVICE IN
LAPLAND.

ROVANIEMI, FINNISH LAPLAND, Oct. 1.—Regular automobile service was recently established by Finnish postal administration between Rovaniemi and Sodankyla in Finnish Lapland. This has proved generally satisfactory and has been utilized by a large number of passengers. This success has caused the administration to establish another line from Sodankyla to Ival.

In the Finland budget this year there was an item of 720,000 Finnish marks (\$138,960 normal value) for the purchase

MUST FORFEIT RIGHTS.

BOSTON, MASS., Oct. 12.

—According to a recent ruling motorists from other states, who are convicted of violating any of the automobile laws in Massachusetts, must immediately forfeit their non-residence rights and must immediately register their cars in Massachusetts, instead of enjoying the 30 days' privilege.

of automobiles for the postoffice. As horses are considered too expensive the postal administration has decided to use automobiles and motorcycles. It thinks that such conveyances should be used also in the rural districts, particularly in the northern parts of the country, where they could carry passengers and goods as well as mail. The administration planned, therefore, after purchasing the necessary automobiles and motorcycles for the cities, to use the balance of the appropriation toward the purchase of one or two automobiles for traffic between Rovaniemi and Sodankyla. As automobile service can be maintained in that district during only a few months of the year, it is thought that tank-like tractors should be procured for winter service.

The expense of postal service between these places has been about 10,500 marks a month. It is calculated that a tractor capable of pulling 10 tons will earn 5000 marks each trip if two sledges are attached to the tractor and loaded with 2000 kilos of goods and five passengers. The expenses of the trip are estimated at 3000 marks, thus leaving a fairly large margin. The inhabitants of Finnish Lapland have applied several times for the establishment of a route northward from Rovaniemi for goods and passengers.

SHOWS NEW TIRE.

AKRON, O., Oct. 10.—Considerable interest in the tire industry has been aroused following the recent announcement of the new Star tire, "Comet," which is made only in 30 by three-inch and 30 by 3½-inch fabric.

BIG REDUCTIONS MADE IN
TRANSPORT PRICES

Cuts of 11 to 25 Per Cent. Announced in Well-Known Truck Line.

MT. PLEASANT, MICH., Oct. 10.—Price reductions ranging from 11 to 25 per cent. on three of the four models comprising its line, are announced by the Transport Truck Co. of this city.

The one-ton model is reduced from \$1850 to \$1395; the 1½-ton from \$2250 to \$1995; 3½-ton from \$4195 to \$3885. The price of \$2795 on the 2½-ton remains unchanged.

"Although Transport prices were never advanced in proportion to the increased costs of materials and labor," says M. A. Holmes, president of the Transport Truck Co., "we are taking this step to meet the popular demand for lower prices and to do our share in speeding up the return to normalcy."

GREELEY BUSESSES EQUIPPED
WITH U. S. TIRES.

NEW YORK, Oct. 14.—Among the familiar sights on the streets of New York are the big Greeley sight-seeing motor busses. Equipped to seat 42 passengers comfortably, the big busses roll easily along the boulevards of the big city, usually completely filled, while a megaphone man describes sights of the town.

Securing the proper tire equipment for busses of this size furnished a real problem, for it was necessary to insure comfortable riding even when travelling at a good rate of speed and also to guard against the danger of skidding.

The following letter from the Greeley Co. to the United States Tire Co. explains how the problem was solved:

"We have just made an addition of three new busses to our present equipment, which gives us a total of 15 busses now in service. The three new busses, as well as the 12 others, are equipped with your tires, nobby cord pneumatics on the front wheels and monotwin solid tires on the rear wheels."



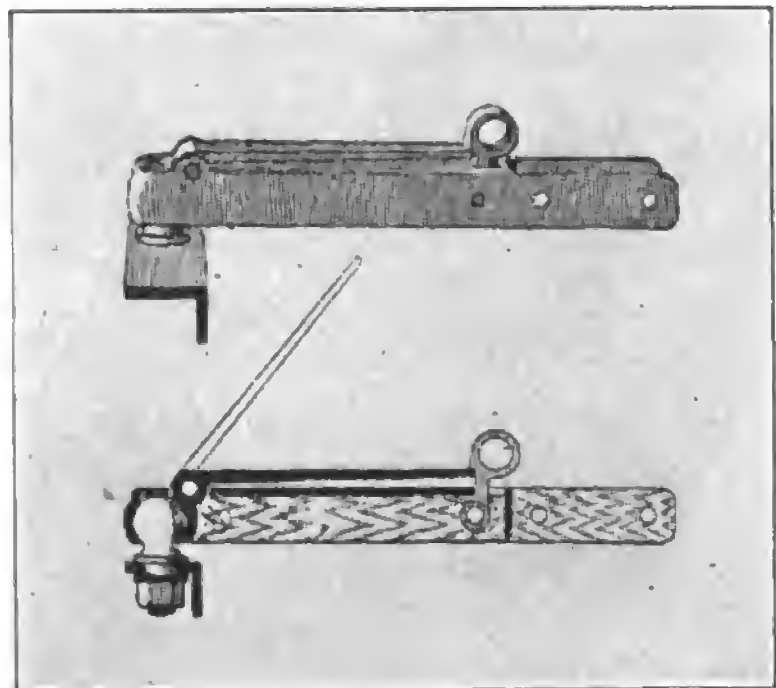
Kant Skore Piston Co.'s New Main Office and Factory at Cincinnati, O.

New Motor Truck Accessories

CORWIN TRAILER COUPLER.

The Corwin Coupler, manufactured by the Corwin Coupler Co., Wellsville, N. Y., has been designed to provide at a moderate price a means of attaching trailers to motor vehicles, that will be quick to apply, give perfect freedom of motion, prove safe and reliable and have no loose parts to rattle or lose.

The perfect freedom of motion is made possible by the ball and socket joint, the ball being attached to the motor vehicle permanently. The socket which fits the ball is composed of two parts, one stationary, which forms the body of the coupling and is attached to the pole of



the trailer, and a movable locking lever of bell crank shape pivoted on the stationary part near the point of intersection of the two arms.

In coupling the trailer the operation is very simple as it is only necessary to place the coupling over the ball and press down on the hand lever until the latch snaps. Price, \$5.

GILLIAM BEARINGS HAVE COMMENDABLE FEATURES.

The Gilliam Manufacturing Co., with factory and general office at Canton, O., report an unusual success and demand for its product, the Gilliam tapered roller bearings. This product was first introduced to the trade in the early part of 1918. The general design and features of construction were soon recognized by automotive engineers as being a distinct advance in tapered roller bearings, with the result that demands were made for sizes to accommodate all makes of cars and trucks. In response to this demand the range of sizes has been increased until today the specification sheets include all the various sizes for passenger cars, trucks, trailers, tractors and general industrial appliances. This is said to be the most complete line of tapered roller bearings manufactured by any one corporation.

An improved design of cage with this bearing permits the use of the maximum number of longer rollers of the largest

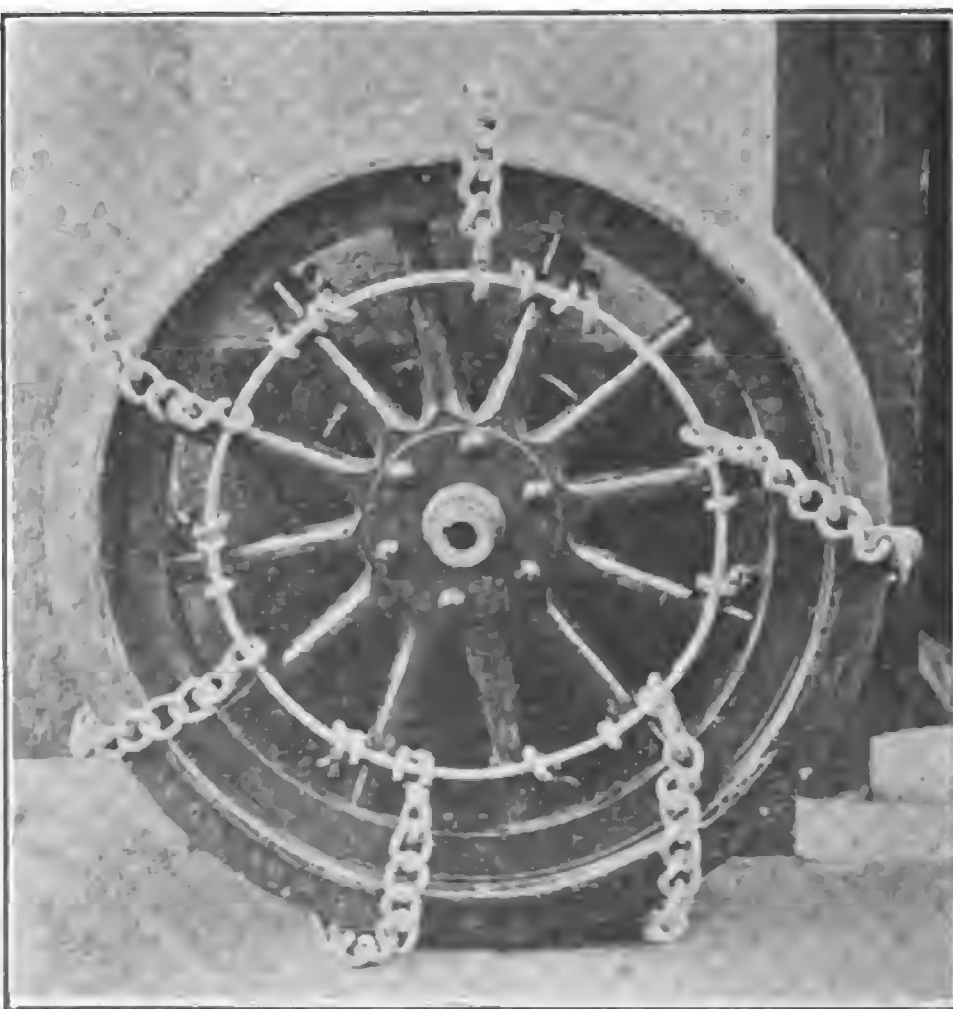


possible diameter. The load is thus distributed over a greater number of rollers, causing less strain upon each roller, which gives greater carrying capacity and longer life to the bearing. Simplicity combined with utility and strength are the main features of the Gilliam rollers. They have no weak sections to fracture or projections to chip off and retard lubrication. Due to their simple design they have a carrying capacity over their entire length. Each roller has a concave depression in the end of the large diameter or thrust end, which acts as a lubricant reservoir. As the bearing revolves the lubricant is drawn out of this reservoir and distributed to the various parts of the bearing by a natural law known as capillary attraction. This insures constant lubrication to all parts of the bearing at all times.

The cone and cup members are manufactured under the same careful supervision and rigid specification as the rollers and cage.

TRUCK-GRIP CHAINS.

The Truck-Grip Chain Co., 2 Columbus circle, corner of 58th street and Broad-



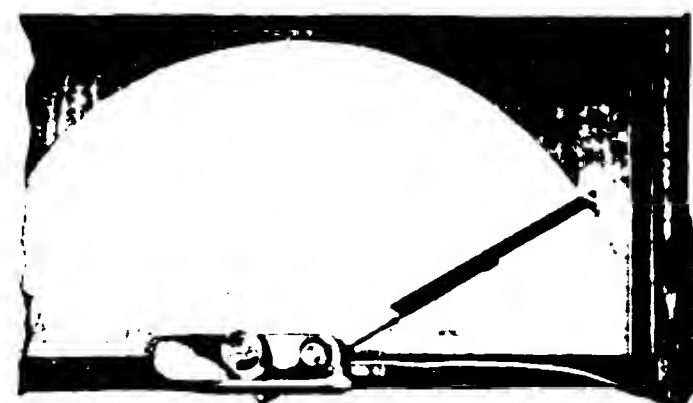
way, New York, states that it is now in production on a special type of cross chain which saves tires.

Wire rims are fastened by special clips to the spokes of the wheel, one inside and the other outside. These may be left in position until it is desired to fit the cross chains, these being fastened to the wire rings by means of spring snaps. This method of fastening allows the cross chains free movement on the tire, preventing excessive wear.

The American Railway Express Co. is stated to have tested this device on its trucks during the winter of 1920 and has adopted it as standard on all its trucks.

EVEREADY AUTOMATIC WINDSHIELD CLEANER.

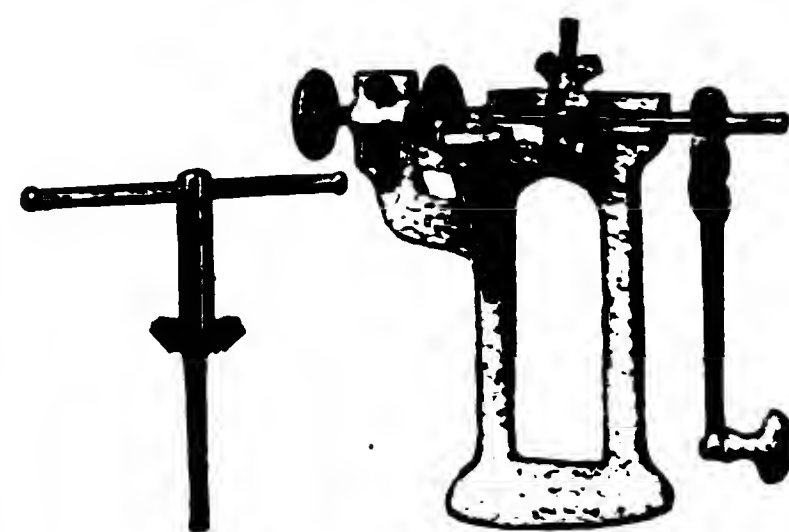
The Apex Electric Manufacturing Co., 1410 West 59th street, Chicago, Ill., has devised a safety device that should find a ready sale among truck owners and others who are called upon to drive in



stormy or foggy weather. The cleaner operates automatically and is stated to keep a section of the shield cleaned during storms or fog, snow or sleet. The device is designed for rough service and is guaranteed perfect. Price, \$10.

VALVE REFACING LATHE.

The R. S. Whitney Manufacturing Co., 74 Nichols street, Lewiston, Me., manu-

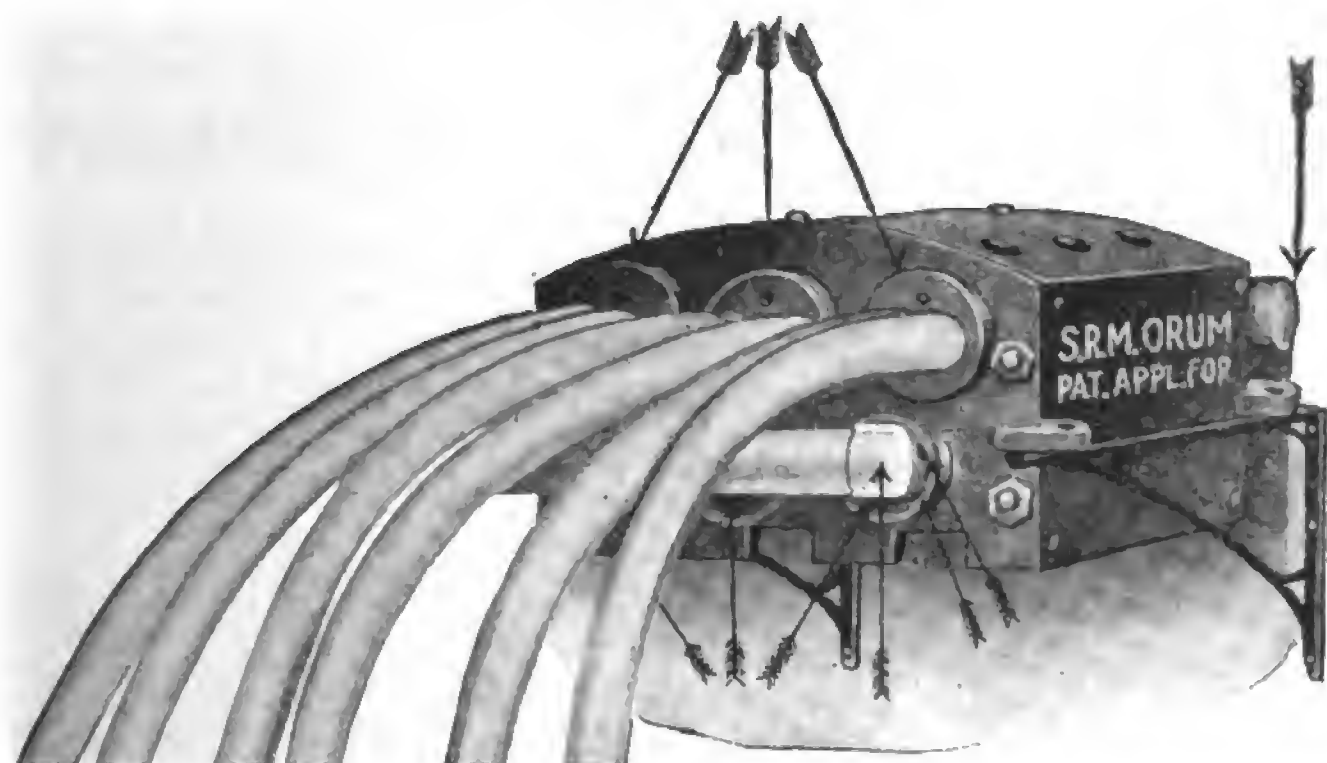


factures a valve refacing tool that will be found very useful in refacing and trueing valves before regrinding. With the valve refacer is also included a valve seat reamer which smooths off the valve seat preparatory to regrinding the valve, shortening the labor of grinding and making a more perfect fitting valve. Price, \$8.50 east of the Rockies and \$9 west of the Rockies.

Practical Tools and Equipment

THE SUPER SIX STEAM GENERATOR.

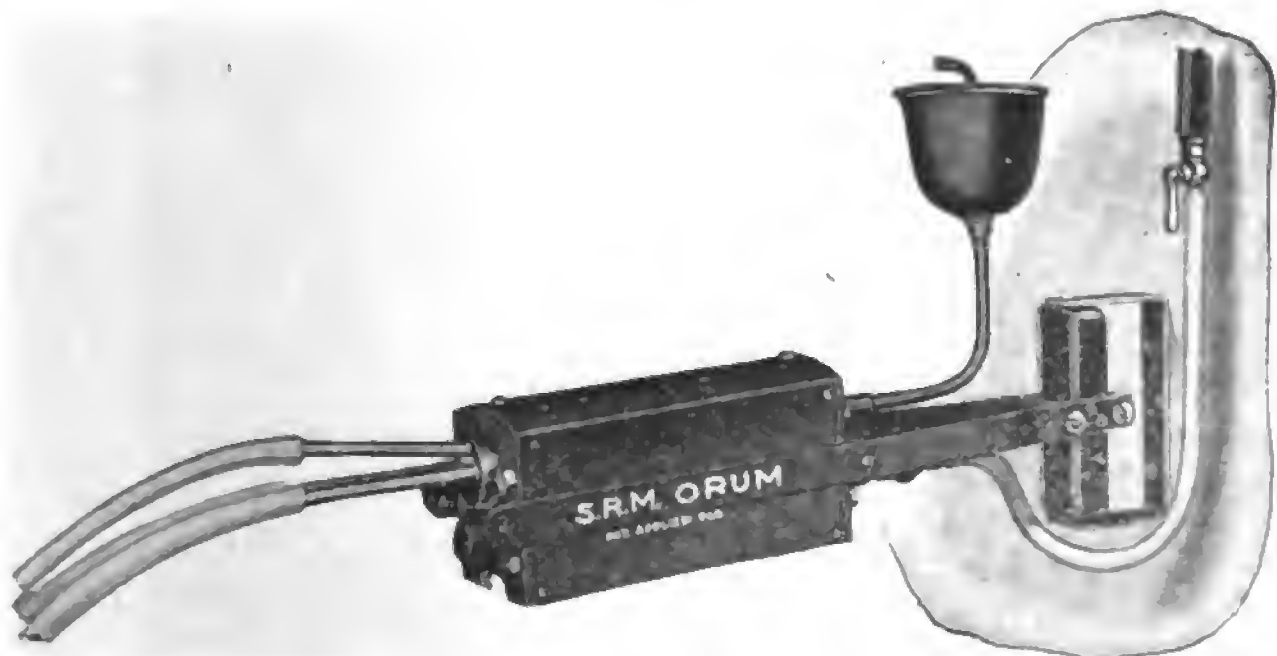
The No. 45 steam generator is a large sized outfit designed for battery stations handling a large amount of work and is equipped with six rubber tubing connections instead of three. The Super Six steam generator is manufactured by S. R. M. Orum, Box 5814, North Philadelphia, Pa., and fastens to the wall by means of special brackets, only uses gas when in use and is instantaneous in action, as the boiler is of the flash type, which is said to be non-explosive. Pressure gauges, safety valves or water gauges are un-



necessary as the device is very simple in both operation and construction. Price, \$30.

INSTANTANEOUS SWINGING BRACKET STEAMER.

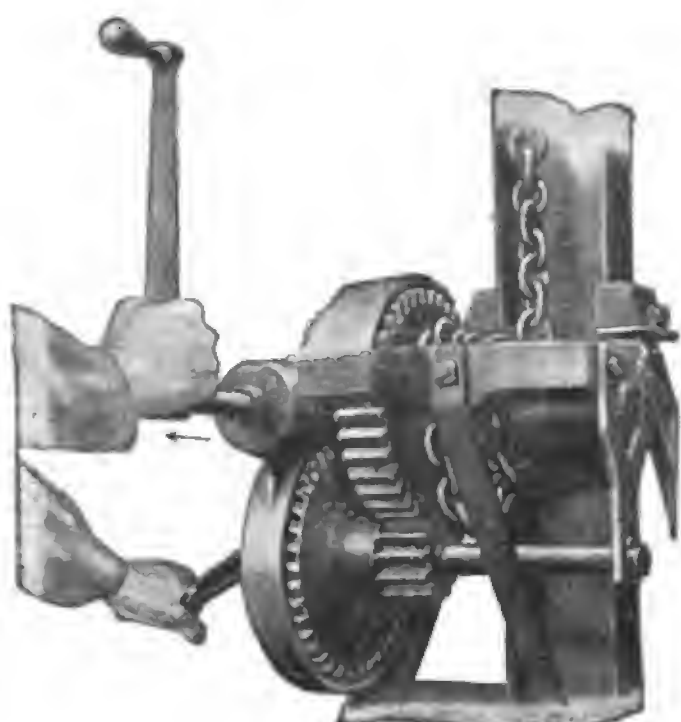
The No. 441 Swinging Bracket Steamer manufactured by S. R. M. Orum, Box 5814, North Philadelphia, Pa., is mounted on a swinging bracket for the convenience of the battery repairer. Gas is used for heating water and for generating steam.



Three rubber tubes lead the steam to the battery cells. No bench room is required as the steamer is fastened to the wall and may be swung in any direction desired. Price, \$18.

WEAVER TRUCK HOIST.

The new Weaver truck hoist in general design is similar to the regular type auto hoist manufactured by this com-



pany, the Weaver Manufacturing Co., Springfield, Ill. The truck hoist is much more heavily constructed, however, being of heavy I-beam stock with a recommended lifting capacity of 6000 pounds for double suspension and 4000 pounds for single suspension.

Greater lifting leverage is gained

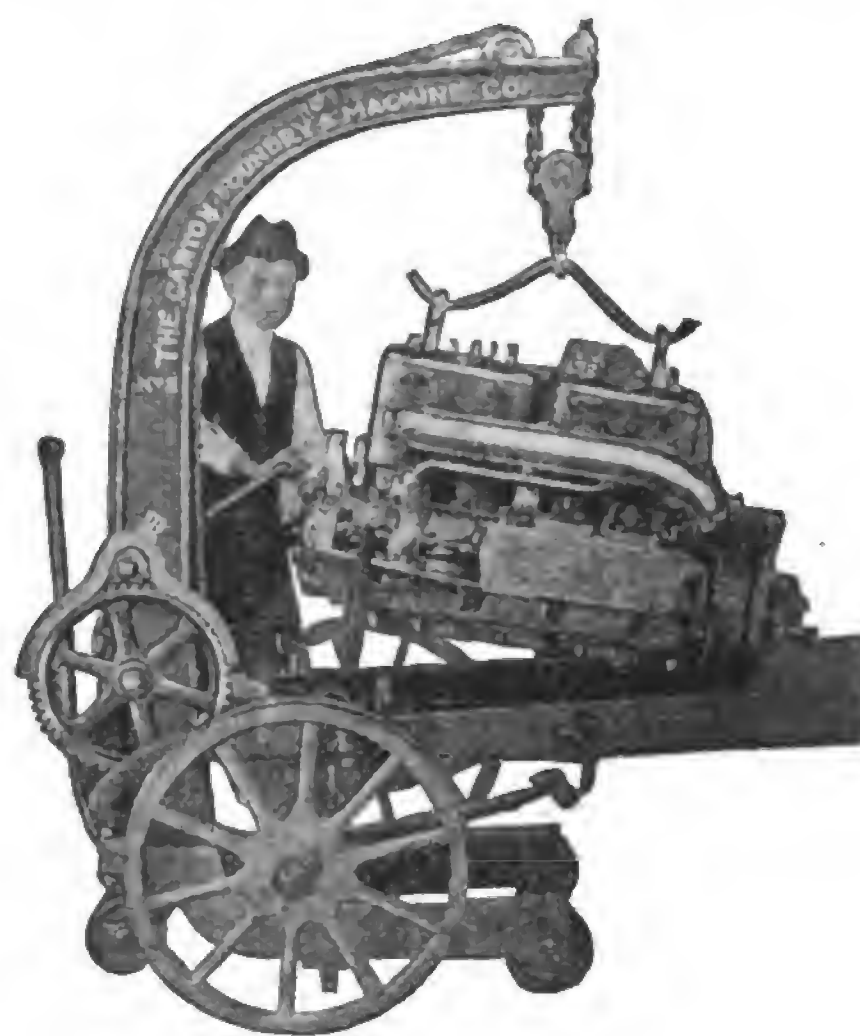


through a compound leverage of the worm gear type giving a theoretical leverage of 600 to one. An auxiliary lever, shown in the second illustration, operates directly on the drum, enabling the slack chain to be quickly taken up and adjusted to the load. The width between the frame is eight feet, four inches, and the minimum height eight feet, four inches, with a maximum height of 10 feet.

CANTON PORTABLE CRANES.

The Canton Foundry & Machine Co., Canton, O., manufactures a portable crane for repair shop, garage and service station trade which embodies many special features desirable for this class of

service. The crane is designed to handle heavy work, such as power units, freight and large pieces of machinery around the shop. Owners claim that the crane en-



ables them to save materially on their work and its ability to pick up its load and transport it to any part of the shop with ease recommends it to intending purchasers.

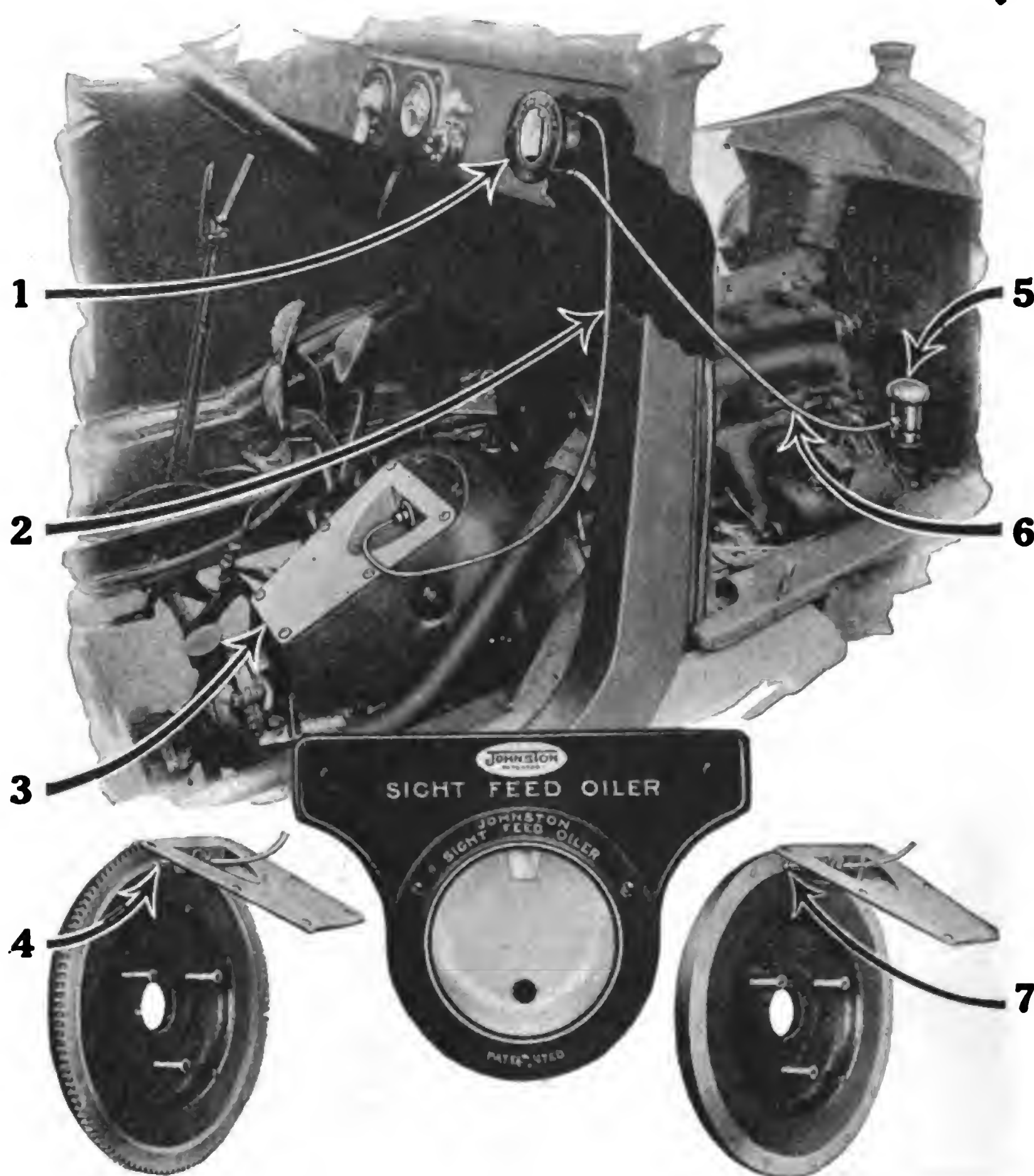
NEEDLE VALVE SEALING POT.

S. R. M. Orum, manufacturer of storage battery tools, box 5814, North Philadelphia, Pa., is showing its No. 26, a needle valve sealing pot, which simplifies the work of sealing storage batteries after they have been overhauled and assembled. The pot is designed to be hung from the ceiling about 12 inches from the



work bench. The needle valve is opened and the melted sealing compound is guided in a small stream around the edge of the cells. Closing the needle valve prevents the sealing compound dripping when the pot is reheated. Price, \$2.50.

The New Johnston Sight Feed Oiler for Ford Cars



Every owner of a Ford car or truck will welcome the fact that a new sight feed oiler for Fords has been perfected by the William R. Johnston Manufacturing Co., 453-467 East Ohio street, Chicago, Ill.

This device is stated to have been tested and tried out under every conceivable condition—in mountainous districts, in all seasons of the year and under no circumstance has it failed to provide oil to the front end of the crank case. The highest and longest hills have no effect on its perfect performance. With it the danger of motor overheating is entirely eliminated.

Being a positive force feed system there is no possible chance of its becoming clogged or getting out of order. Even when the regular system becomes clogged the Johnston Sight Feed oiler, working independently, positively keeps the car properly lubricated. This eliminates all possibility of burning out bearings.

An illustration of the Johnston oiler is shown herewith.

Arrow No. 1 points to the gauge that designates at all times whether or not the motor is being supplied with the proper amount of oil.

No. 2 is a 1/4-inch or smaller diameter copper tubing that connects the adjustable brass intake sleeve containing the case-hardened steel plunger with the upper gauge coupling and through the centrifugal force of the fly wheel, carries a continuous stream of clean oil from the machined portion of the face of the fly wheel and forces it up through the gauge

and thence to the filler cap sleeve.

No. 3 is the steel transmission cover, furnished with cork gasket, and containing the adjustable brass intake sleeve, as described above.

No. 4 shows the relative position of the plunger, the intake sleeve and the transmission cover; also a portion of the copper tubing leading to the gauge. It also shows the machined surface of the face of the fly wheel on which the plunger travels, being held yieldably in position by the intake sleeve. Note that the sleeve is adjusted to the lowest position in the slot.

Arrow No. 5 points to the steel filler cap sleeve, which eliminates the necessity of drilling a hole. Merely remove the cap, put the sleeve in the position shown and replace the cap.

No. 6 is the 6/16-inch or larger diameter copper tubing, which connects with the lower fitting in the gauge to the one in the filler-cap sleeve. This causes a continuous stream of oil to flow over the timing gear, doing away with practically all timing gear noise.

No. 7 shows how on the old type of fly wheel, in order to adjust the steel plunger so that the contact comes just below the brass rivets on the face of the fly wheel as indicated all that is necessary is to loosen the lock nut on the intake sleeve and raise the sleeve to the top of the slot in the transmission case cover. Then tighten lock nut in position and turn the motor over a few times by hand. If there is

a clicking noise the plunger is striking the rivets on the fly wheel, and the intake sleeve must be lowered slightly until the plunger just clears the rivets. Then tighten the lock nut firmly and attach the copper tubing.

In the center is a view of the sight feed gauge and bracket that can be used in making installation on any type of Ford car or truck; if desired, the bracket can be detached and by cutting a two-inch hole in the instrument board, can be installed flush with the board, as shown in the top illustration.

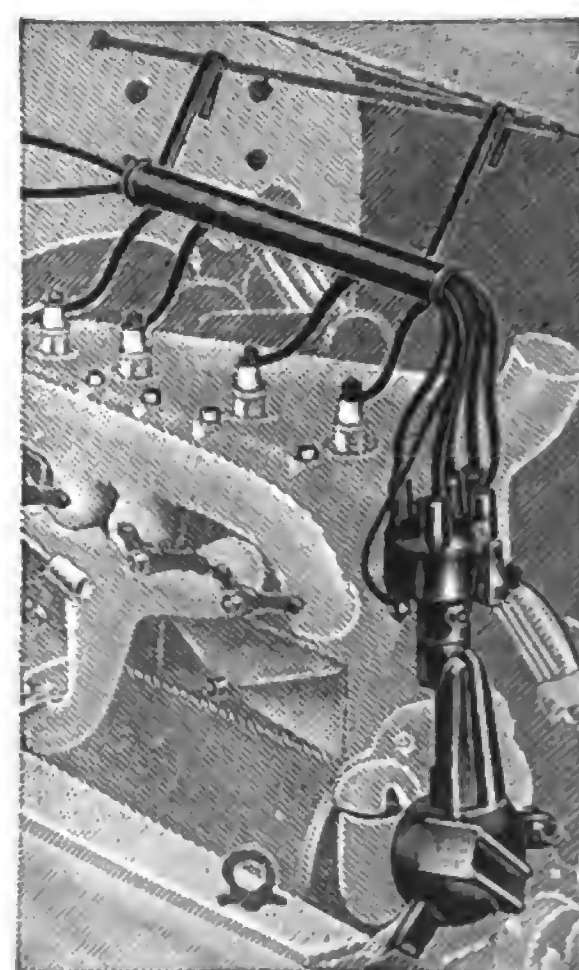
It should be understood that the oil does not flow by gravity from the gauge to the filler cap sleeve. It is actually forced there. The continual flow of oil on the timing gear quiets the timing gear and drops the oil down into the front compartment of the motor, where it flows back through the various compartments to the sump under the fly wheel.

This complete system has been so designed that it can be easily installed by any Ford owner.

NEW YORK UNI-COIL DISTRIBUTOR.

The New York Uni-Coil distributor is stated to be one of the most needed, largest-selling and greatest value-giving devices in its field yet produced. It does away with the timer with all its troubles of short circuits and oil-soaked wires and eliminates three of the coils in the ordinary Ford outfit. It operates either from the Ford magneto or battery; therefore the car may be driven on the magneto, regardless of the condition of the battery or even when the battery is removed entirely.

It requires but half an hour to install on any Ford model from 1910 to date and is stated to positively prove a revelation in smoothness, easy starting and extraordinary pulling ability with an entire absence of all ordinary troubles. It is not an experimental, unproven device—the



principles embodied are the same as employed on some of America's highest priced cars. It has been in use by thousands of Ford owners for the past eight years, the maker claims.

The Uni-Coil distributor is manufactured by the New York Coil Co., 338 Pearl street, New York City. Retail list price, complete, \$14.

O. M. VETT SAYS

"What's the idea of the linen duster?" I asked O. M. Vett as he came briskly into his office on a bright September afternoon. "Fraid of the dust in our immaculate city streets?"

"No. But I've been where a fellow needed a duster all right," grinned Vett as he scraped the ashes from a decadent cigar and blew through the end of it to restore its circulation. "Yes, sir, I've been where there's two kinds of dust and I got my share of both kinds, too, I'll tell the world," he finished, scraping an experienced thumb nail across the head of a match and lighting his stogie.

"Just what do you mean by 'two kinds of dust?'" I asked.

"I mean road dust from poor highways and gold dust from rich farmers," answered the old man. "I got the first from these trice-accursed county roads the the town surveyors are too mean to fix, and the second from finding farmers who wanted to buy trucks."

"Good for you," I said, much interested. "I've always had an idea that a crack salesman could go out and hand these fellows a wallop if he was smooth enough."

"What do you mean by 'smooth enough?'" bristled Vett. "You don't think I'm a slicker, do you?"

"Not that at all," I hastened to answer. "But these farmers—they hate to buy trucks—according to what people tell me. Kinda grasping—want to hang on to their money," I explained.

"Who says so?" asked Vett. "I don't find any trouble with them. Where'd you get the idea they were hard to do business with?" he wanted to know.

"Well—," I answered, trying to think of a fitting reply, "salesman have told me that the average farmer was rather hard to do business with."

"Well, perhaps some 'salesmen' haven't been able to sell them trucks, but I believe that the farmer is about the most reasonable buyer that I do business with. All he wants is to be shown, and he's certainly got a right to that much consideration, hasn't he?" he asked truculently. Then before I could answer. "Trouble with a lot of your salesman friends is they want to make sales sitting in an office somewhere. Hot air is all right for an apartment house in winter, but demonstration is what sells a farmer trucks. You get the idea?" he asked, as he gave a final puff to the cigar.

"I understand," I nodded. "They want to be shown before they buy."

"They sure do," nodded Vett. "An' I'm

the man who knows it. That's why I sell trucks to them. The first principle of successful salesmanship is 'actions speak louder than words,' and the old Count of Monte Cristo sure said a mouthful when he gave birth to that maxim. That old fellow would have made a mighty good salesman."

CARRYING BUSINESS DIRECT TO RETAILER.

Carrying his business on wheels directly to his dealers' customers is the successful and novel experiment of a large New England grain house, whose clientele is naturally among the farmers. This being the busiest time of the farmer's year, it is a great convenience to him to have a completely equipped poultry and stock-feeding motor truck display drive into his door yard and demonstrate there the comparative values of various kinds of scientific feeds for live stock. Orders, to be filled by the local dealer, are taken by the demonstrating crew. Moreover, the cost of advertising products by this method proves to be less than those of older days.

The truck body has a glassed-in partition on either side, divided into compartments, openly displaying 18 different varieties of grain.

The front part carries a dozen laying hens, blooded White leghorns, exposed to view, and the rear is equipped with sleeping quarters for two men, having a full supply of cooking facilities and paraphernalia necessary for camping while on the road.

A tent is carried at times and is used as an auxiliary rest room.

A Dodge Brothers chassis, sold by the Henshaw Motor Co., Boston, Mass., with this unique body mounted on it, was sent out by the Charles M. Cox Co. of Boston, Mass.

SHORT CIRCUITS.

Short circuits are very likely to be caused by carbon, fuel or water collecting on the points of the spark plugs or on the outer surface of the insulation or by cracks in the porcelain insulation of the plugs. To test for short circuits take out the plug and lay it so that the outer shell only is in contact with the cylinder and then crank the engine. If there is a spark at the plug, but no spark at the points when the cable is connected, obviously the plug is short-circuited and should either be taken apart and cleaned or replaced with a new plug.

STOP THE KNOCK.

The grinding of the valves and the removal of carbon will not eliminate a knock caused by loose bearings. If the knocking only occurs when the engine overheats, the cooling system is defective. If the knocking is growing worse some bearing is coming loose and the engine will have to be taken down to repair it. It is extremely dangerous to run the engine in this condition.

GROWLER VISE.

The following suggestion is offered for changing a growler vise over to an electro-magnetic vise for holding armatures.

Mount a double-pole, double-throw switch on or near the growler; connect the growler leads to the center poles; join the alternating current line to one side to supply current for testing in the usual manner; connect a 12-volt, direct-current line to the other side to be used to convert the growler into a vise.

Obviously it is only necessary to throw the switch from the alternating current side to the direct current side to make the unit into a vise.

In case the direct current supply available is 110 volts, or approximately that of the alternating, a suitable resistance will have to be used in the direct current line as the direct current resistance of the growler is very low.

This growler vise has several advantages over the ordinary vise for armature work. It will accommodate any size or type of automobile armature without danger of injury to the laminations or coils. While the armature will be held firmly, it may still be moved or rotated by hand.

REMOVABLE CYLINDER HEADS.

The hold-down nuts of removable cylinder heads should be tightened periodically if the cylinder head is removed for any reason. In replacing the part should be tightened up again by screwing down opposite nuts. Each nut should be turned a little, then its opposite should be screwed down to match and so on, working around the cylinder head. If the nut is tightened all the way there is always danger of springing the part.

After the nuts have all been tightened on a cold engine, start the engine and allow it to warm up, then tighten the nuts again while the engine is still warm to take out the looseness due to the expansion of the metal in the head and cylinder castings. The nuts should be tightened in the same manner as at first, that is, opposite nuts rather than in rotation.

EASY INFLATION OF TIRES.

An important advantage offered for Disteel wheels is the right angle valve extension with which tires may be inflated from the outside.

This advantage is greatly appreciated by those who look after their own cars, and especially where on occasion a woman driver must inflate a tire.

The valve extension is of the well known Schrader make and is supplied as optional equipment on Disteel wheels. Those who have Disteel-equipped cars and wish to install this device may obtain it at a nominal cost from the Disteel Wheel Corporation, Detroit, or from any of its factory branches or service stations.

Bellevue Hospital in New York city operates seven motor ambulances and one bus for the insane.

Automobile Prices Are Still Dropping

Following List Gives Principal Changes in Well-Known Lines Since July 1 When Fluctuations Were Shown in the Automobile Journal

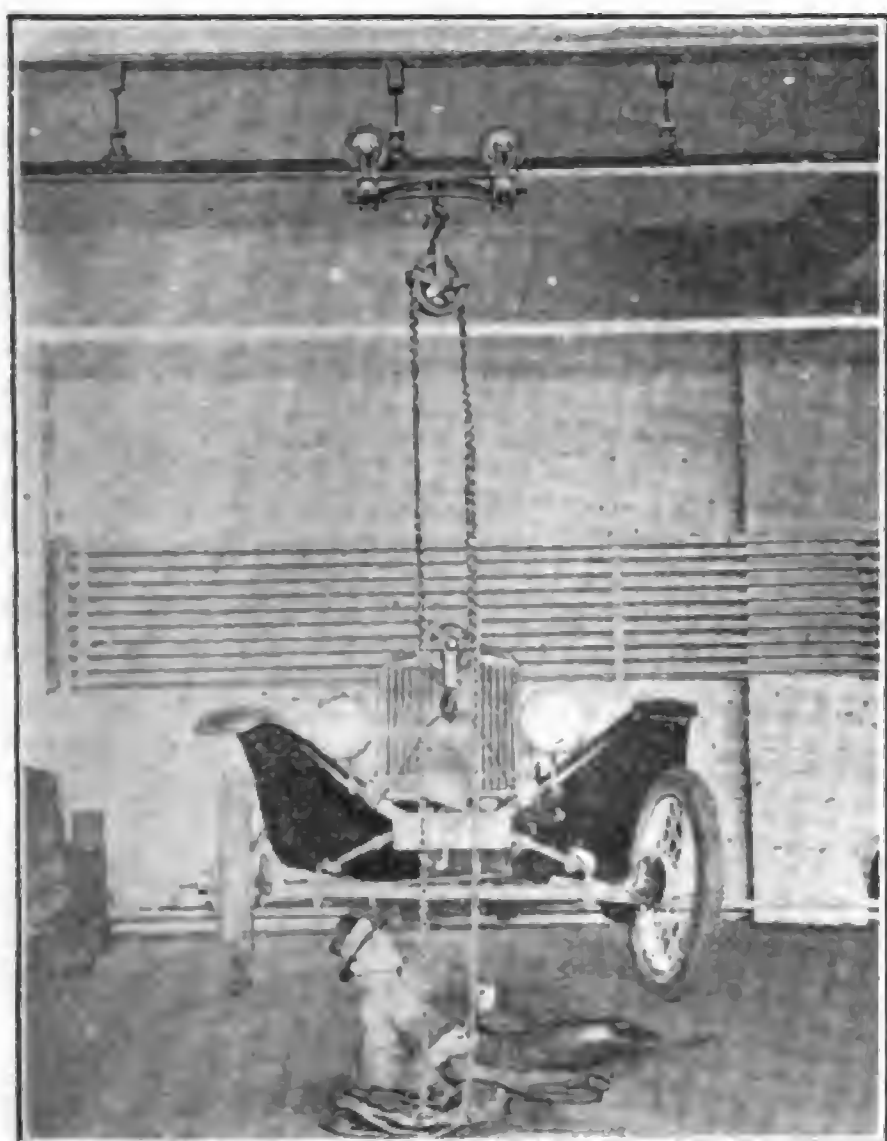
Make and Model	Old Price	New Price	Decrease	Make and Model	Old Price	New Price	Decrease
Allen Touring	\$1395	\$1195	\$200	Noma, 4-pass.	3200	2850	350
Allen Special Touring	1695	1495	200	Noma, 6-pass.	3500	3200	300
Allen Sedan	2195	1845	350	Noma, Sedan	4350	3700	650
Anderson Touring 5-pass.	1795	1650	145	Oakland Sedan	1815	1725	90
Anderson Touring, 7-pass.	1845	1795	50	Oldsmobile 43-A Touring	1345	1145	200
Anderson Sedan, 5-pass.	2795	2550	245	Oldsmobile 43A Roadster	1325	1145	180
Anderson Sedan, 4-pass.	2795	2450	345	Oldsmobile 43-A Coupe	1895	1645	250
Anderson Sport Tour. 4-pass.	1845	1750	95	Oldsmobile 43-A Sedan	2100	1845	255
Anderson Sport Spec. 4-pass.	new	1850	...	Oldsmobile 47 Touring	1725	1625	100
Apperson 8-21 Touring	3500	3250	250	Oldsmobile 47 Coupe	2225	2185	40
Apperson Anniversary Touring	4250	3750	500	Oldsmobile 47 Sedan	2425	2425	...
Briscoe Touring	1285	1085	200	Oldsmobile 46 Touring	1875	1735	140
Briscoe Sedan	1885	1685	200	Oldsmobile 46 Pacemaker	1825	1735	90
Buick Four Touring	new	975	...	Oldsmobile 46 Sedan	2775	2625	140
Buick Four Sedan	new	1650	...	Overland Touring	695	595	100
Case Touring	2650	2250	400	Overland Sedan	1275	895	380
Case Sedan	3750	3285	465	Packard 6 Sedan	4250	3975	275
Champion Touring	1250	1095	155	Packard 12 Touring	6000	4850	1150
Champion Special Touring	1595	1395	200	Packard 12 Sedan	8450	6800	1650
Chevrolet 490 Touring	625	525	100	Peerless Touring	2990	2880	110
Chevrolet 490 Roadster	625	525	100	Peerless Sedan	3950	3790	140
Chevrolet Coupe	975	875	100	Piedmont 4-30 Touring	1270	970	300
Chevrolet 490 Sedan	975	875	100	Piedmont 6-40 Touring	1495	1285	210
Chevrolet FD Touring	1185	975	210	Pierce-Arrow Touring	7500	6500	1000
Chevrolet FD Sedan	1885	1575	310	Pierce-Arrow Sedan	9000	8500	500
Cole Touring	3250	2795	455	Premier Touring	4600	3890	710
Cole Sedan	4450	3995	455	Premier Sedan	6100	5190	910
Columbia De Luxe Tour. 5-pass.	1795	1495	300	Reo Series A Touring	1850	1650	200
Columbia De Luxe Sport 4-pass.	1795	1495	300	Reo Series A Sedan	2750	2350	400
Columbia De Luxe Roadster 2-pass.	1795	1475	300	Roamer (with Continental Engine), Touring, 4-pass.	2985	2485	500
Columbia De Luxe Coupe 4-pass.	...	2295	...	Roamer Sport, 4-pass.	3150	2650	500
Columbia De Luxe Sedan 5-pass.	2595	2350	245	Roamer Roadster, 2 and 4-pass.	3150	2750	400
Columbia Challenger, Tour. 5-pass.	1495	1195	300	Roamer Touring, 7-pass.	3250	2750	500
Columbia Challenger Coupe, 4-pass.	2295	1995	300	Roamer Cabriolet, 3-pass.	3850	3650	200
Columbia Challenger Sedan, 5-pass.	2295	1995	300	Roamer Coupe, 2-pass.	3985	3850	135
Durant 4 Touring	new	890	...	Roamer Sedan, 5-pass.	4100	3950	150
Durant 4 Sedan	new	1365	...	Roamer Suburban Sedan, 7-pass.	4500	4250	250
Elcar 4 Touring	1300	1195	105	Roamer (with Duesenberg Engine), Touring, 4-pass.	3985	3650	335
Elcar 6 Touring	1700	1595	105	Roamer Sport, 4-pass.	4150	3785	365
Elcar 6 Sedan	2600	2495	105	Roamer Roadster, 2-pass.	4150	3850	300
Essex Touring	1445	1375	70	Roamer Speedster, 2-pass.	4250	3985	265
Essex Sedan	2300	2230	70	Sayers Touring	2195	1945	250
Ferris Touring	3350	2595	755	Sayers Sedan	3295	2995	300
Ferris Sedan	4100	3695	405	Scripps-Booth F-43 Touring	new	1490	...
Ford Regular Chassis	345	295	50	Scripps-Booth F-43 Sedan	new	2375	...
Ford Runabout	370	325	45	Stephens Touring	2400	1985	415
Ford Touring	415	355	60	Stephens Sedan	3400	3100	300
Ford Truck Chassis	495	445	50	Stevens-Duryea Family Touring	8000	6800	1200
Ford Coupe	595	495	100	Stevens-Duryea, 4-pass., Touring (Sport)	...	6900	...
Ford Sedan	760	660	100	Stevens-Duryea Roadster	...	7250	...
Franklin Touring	2650	2350	300	Stevens-Duryea Vestibule Limousine	...	8600	...
Franklin Roadster	2550	2300	250	Stevens-Duryea Sedan, 5-pass.	9500	9000	500
Franklin Sedan	3650	3350	300	Stevens-Duryea Three-Quarter Limousine	...	9500	...
Franklin Brougham	3550	3250	300	Stevens-Duryea Coupe	...	9500	...
Hanson Six Touring, 5-pass.	2365	1795	570	Stevens-Duryea Cabriolet	...	9500	...
Hanson Six Touring, 7-pass.	2465	1895	570	Stevens-Duryea Chassis	...	5600	...
Hanson Six Roadster, 2-pass.	2365	1795	570	Studebaker Light 6 Chassis	...	975	...
Hanson Six Sport, 5-pass.	2465	1895	570	Studebaker Light 6 Roadster, 2-pass.	1300	1125	175
Hanson Six Coupe, 4-pass.	3465	2775	690	Studebaker Light 6 Touring	1335	1150	185
Hanson Six Sedan, 5-pass.	3565	2885	680	Studebaker Light 6 Coupe Roadster	1695	1550	145
Haynes 55 Touring	new	1785	...	Studebaker Light 6 Sedan	1995	1850	145
Haynes 55 Sedan	new	2835	...	Stutz Touring	4000	3350	650
Haynes 75 Touring	new	2485	...	Templar Touring	2385	1985	400
Haynes 75 Sedan	new	3485	...	Templar Sedan	3185	2785	400
H. C. S. Touring	2975	2775	200	Vellie 48 Touring	1885	1585	300
Holmes Touring	3350	2950	400	Vellie 48 Sedan	2885	2485	400
Holmes Sedan	4550	4150	400	Vellie 34 Touring	1485	1385	100
Hudson Touring	2250	1895	355	Vellie 34 Sedan	2485	2085	400
King Touring	2725	2225	500	Westcott Lighter 6 Touring	2290	1890	400
King Sedan	4035	3235	800	Westcott Lighter 6 Roadster	2290	1890	400
Kissel Standard Touring	2775	2475	300	Westcott Lighter 6 Coupe	3390	2890	400
Kissel De Luxe Touring	3475	2975	500	Westcott Lighter 6 Sedan	3390	2590	400
Kissel De Luxe Sedan	4275	3775	500	Westcott Lighter 6 Sport	2390	1990	400
Kline Touring	2290	2090	200	Westcott Larger 6, Touring	2990	2090	900
Liberty Touring	1860	1595	265	Westcott Larger 6, Sedan	4590	3490	1100
Liberty Sedan	2900	2495	405	Westcott Larger 6, Limousine-Sedan	4690	3690	1000
Mercer, All Open Models	4500	3950	550	Wills-St. Claire, Touring, 5-pass.	3200	2875	325
Mercer Limousine	6200	5650	550	Wills-St. Claire, Roadster, 4-pass.	...	2875	...
Mercer Coupe	5700	5150	550	Wills-St. Claire Coupe, 4-pass.	...	3750	...
Moon 6-48, Open Models	1985	1785	200	Wills-St. Claire, Sedan, 7-pass.	4700	4100	600
Moon 6-48, Enclosed Models	2985	2785	200	Willis-Knight, Touring	1895	1525	370
Nash 6 Touring	1695	1545	150	Willis-Knight, Sedan	2750	2395	355
Nash 6 Sedan	2895	2695	200				
Nash 4 Touring	1395	1195	200				
Nash 4 Sedan	2185	1935	250				
National Touring	3750	2990	760				
National Sedan	4950	3990	960				
Noma, 2-pass.	3000	2800	200				

Note: Touring car prices are for five-passenger models where one is built, otherwise seven-passenger.

Increases Shop Efficiency

Repair Shop, Garage and Service Station Find Cleveland
Tram Rail Labor-Saving Adjunct to Conduct of Business
—Easily Installed and Moderate Priced.

THE garage repair shop has reached a state of development where it possesses an organization and modern equipment similar to that found in modern factories. Their similarity does not end there, however, for like the factories and plants of today the garage men have their problems to solve in meeting the pressure of the demand for lower costs.



Showing Method by Which Car to Be Worked on Is Suspended from Rail.

Leading garage men are aware of the fact that it is folly to await a fall of prices to lower their costs—they are making a careful analysis of their own organization and, with the facts in hand, are putting into force improved methods and new economies. One of the first factors to be considered is the stock room, because in this department great waste can live unmolested unless a very thorough method is in force.

In the first place, only a man who has a tendency for details should be in charge, for a good system is of no avail unless operated with exactitude. The records should be such that a perpetual inventory of the entire stock is available at all times. Such a system is easy to maintain and is of great value to the man in charge of the stock room.

In addition to this the length of time required to order and receive a supply of each article should be determined as nearly correctly as possible; then the average quantity used in this length of time should be determined and recorded on the stock card as the minimum number permissible to carry. Consequently, when the stock nears this minimum amount the stock record tells the stock clerk when to order, thus avoiding the re-

sultant loss of profits which occur from running out of stock or being overstocked. This same careful study, when applied to each element, will bring many desired savings; especially is this true in respect to the equipment used. With crude or impractical tools the workmen are handicapped and produce not over half a day's work for a day's pay. The most satisfactory method is to install and arrange the equipment on a production basis. Start in by discarding those time-wasters, the pits, which not only waste time, but are also very dangerous traps; and as they cannot be as wide as the car, the operations which can be performed in them are limited; but to raise the machines by jacking is not a very speedy nor safe method either.

The most satisfactory method is to raise the cars by hoisting from overhead, but a crane would be out of the question, because heavy building columns with their attached runways must be included. The monorail system would prove more economical than the crane, but here again experience has demonstrated that the monorail is not sufficiently flexible for most garages and repair shops, and then its installation is quite an engineering proposition which, in many cases, makes its cost prohibitive.

Cleveland Electric Tram Rail.

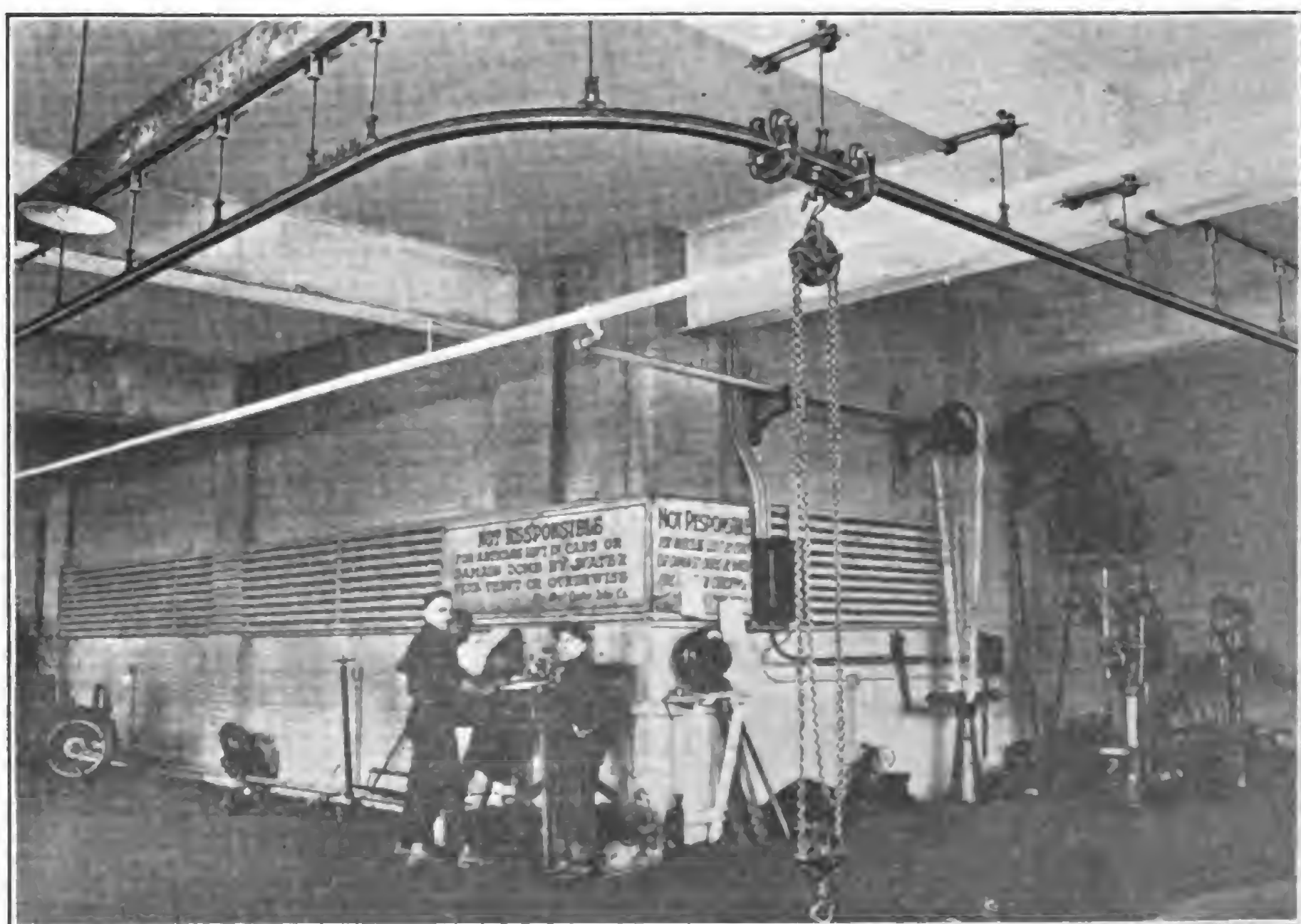
There has, however, come forth quite recently, an entirely new development that may be the key to the solution of this perplexing problem. It is the Cleveland Electric Tram Rail, an off-shoot of the Cleveland Crane & Engineering Co.,

which actually operates overhead and yet is so flexible that it reaches into every nook and corner, and eliminates the need of various other equipment, such as engine stands, jacks, horses, etc.

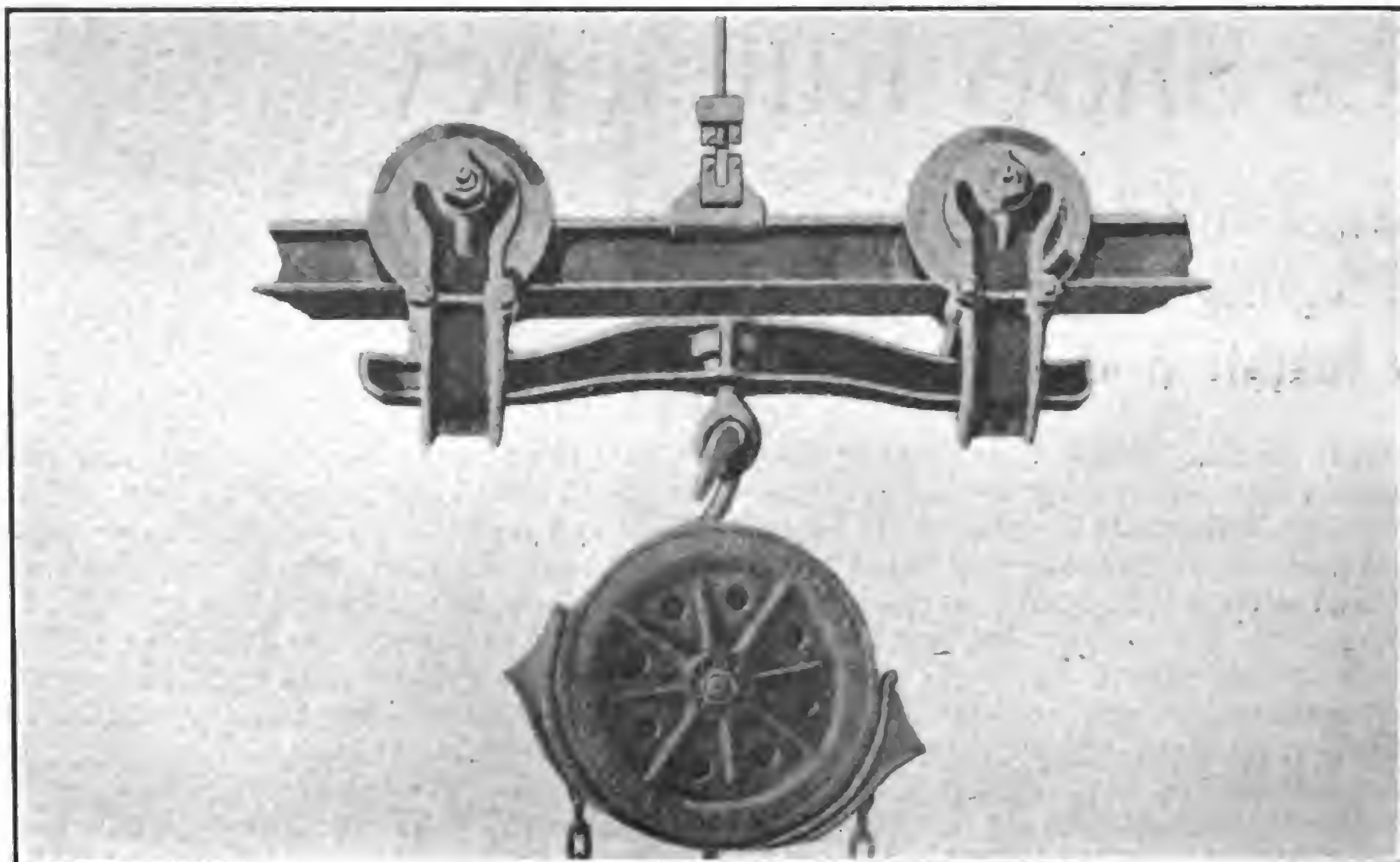
Types of this tram rail are shown in the pictures. The feature of this system, which gives it unlimited adaptability, is the flexibility of the installation of the rail. In other words, "Its feature is in the rail," which truly tells the story, and is accounted for by the combined efforts of those engineers who build Cleveland cranes. The extent to which this flexibility has been developed is amply shown by the methods of suspension, which consist of hanger rods, brackets and rail clamps, which can be attached to the purlins of a building or most any support available, and each condition has its fittings.

For all loads up to the maximum capacity of two tons the rail support clamps are placed three feet apart. In fact, the entire system is standardized so that any mechanic, possessing a common knowledge of machinery, can lay out, order and install the rail, rail fittings, switches, turn-tables, carriers, etc., for it requires no more engineering skill than is necessary to install an ordinary pipe line; as with a pipe line the fittings, etc., are ordered direct from stock.

By use of cold bends in the above-mentioned rail any corner or curve down to a four-foot radius can be easily made without a sacrifice of safety. Even though this bend is quite a feat for a rail of its size, it is easily accomplished by the use



The Cleveland Tram Rail Has Been Used with Most Satisfactory Results by Many of the Larger Automotive Establishments.



This Illustration Gives a Remarkably Good View of a Short Section of the Tram Rail and the Type of Hoist Used.

of a special bending device. It is stated to have been proven that the special steel of which it is made will wear longer than other materials which will stand but one-half of this bending.

Departure from Usual Type of Switch.

A clever departure from the usual type of switch employed in overhead systems is the sliding switch designed especially for this tram rail. Like the other units of the system these switches are absolutely standard and possess many distinct advantages. Whether for hand power or electric, the same switch is installed, which permits the hand-power system to be electrified at any time. In action this switch makes no noise and the carrier glides over it with hardly a sound, a sure indication of mechanical perfection, which is accounted for by the fact that both the stationary and movable rail are held in firm contact, eliminating the open space at the point where the rails join. Safety was given special attention at this point, with the result that the instant a switch is opened a safety stop drops on the rail, preventing the carrier from passing that point and, when the ling and requires but one man.

switch is in position, it is automatically locked, which prevents the carrier and its load from sliding the switch out of alignment. When desired an additional safety feature, the installation of a trolley wire insulator, makes it impossible for an electrically driven carrier to run at full speed against a safety stop or open switch, which makes the switch entirely fool-proof.

In the installation of this system it is often found necessary to install the rail at different levels, which naturally means that the carriers must travel a grade, and up to a grade of $12\frac{1}{2}$ per cent. the electrically driven carrier has ample power to operate with its full load. This, of course, makes the employment of a brake quite essential, which is fully met by a powerful foot brake provided only on carriers travelling a grade. Where the difference in levels is greater than it is practical to climb, an ordinary freight elevator is installed with the tram rail. This method safely lifts or lowers the carrier and its load to the desired level without rehand-

By use of a central control system, several different individual carriers can be operated by one man, located in an ad-

vantageous point, from which an unobstructed view of the system is possible, or, if this is impossible, the operator is informed as to the location of the carriers he controls by signal lights on a board before him. With this arrangement the dispatcher can switch the carrier to any track or location desired, thus doing the work of many men in but a fraction of the time, and at a minimum cost.

The carriers shown on these pages are some of the 1920 types it is possible to obtain through the combination of the standard equipment, which are applicable to handling many materials with dispatch and economy. An important innovation of this system is the manner of installing the tram rail transfer bridge, which gives accessibility to every point on the floor. A standard rail, installed along the length of the building on both sides, forms the runway for the transfer bridge, which permits the carriers to operate from the tram rail track on to the bridge. The versatility of these carriers, their almost human ability to do work, does not sacrifice those essential features that give permanency and low maintenance costs.

The illustrations give an idea of the few working parts, which are fully enclosed so that fumes, moisture and dirt cannot shorten their life, but the ball bearings, which smoothly carry the heavy loads, and other bearings, of bronze with graphite inserted bushings with ample provision for self-lubrication, are not in view; yet they are so placed that, if it becomes necessary to remove them, they are readily accessible.

In every instance where installed, it is cited that the Cleveland Electric Tram Rail system of overhead handling has effected large savings in labor, time and losses due to breakage.

A most instructive illustrated book on tram rails as an economical means of handling and conveying materials has just been published by the Cleveland Electric Tram Rail division of the Cleveland Crane & Engineering Co., Wickliffe, O. A copy of this new book will be sent without charge to readers of this magazine who are interested in cutting their material handling costs.

CHAIRMAN OF GOOD ROADS BOARD.

WASHINGTON, D. C., Oct. 13.—Negotiations which have been in process for several weeks between the American Automobile association and Henry G. Shirley of Maryland, with a view to obtaining the services of the latter as chairman of the organization's Good Roads board, have been just brought to a happy conclusion, according to an announcement made here by President George C. Diehl.

Mr. Shirley's appointment becomes effective immediately. The new chairman is one of the most widely and favorably known highway authorities in the United States. He was the first president of the American Association of State Highway Officials, and brings to the A. A. A. chairmanship exceptional ability that will unquestionably redound to the benefit of highway users everywhere in the country.

Coupled with Mr. Shirley's acceptance,

plans are now being made for the entire reorganization of the roads board with the idea of making it an even more active force in stimulating sound highway development in all of its phases.

"Our work will be purely educational," states Mr. Diehl, "and it is our desire to lend effective cooperation to legislators and officials who are seeking to bring about sound methods in the administration, financing, construction, maintenance and use of our highways. The far-reaching changes which have been effected through the growing use of the motor vehicle require new methods, and as the representative body of automobile owners, we believe that no organization should have a closer insight into these questions than our own. To this end we propose to invite the best known experts in the country to work with us in order that we may both place before them the needs of the owner and receive in turn

the suggestions of the builder."

Mr. Shirley has seen long service in highway work. A graduate of the Virginia Military Institute, he first undertook railroad engineering, then became road engineer of Baltimore county, Maryland. In May, 1912, he was appointed chief engineer of the Maryland State Road commission and it was during his long term in this office that Maryland's great system of highways was constructed. In 1917 and 1918 he represented the state highway officials on the Highway Transport committee of the Council of National Defense, later becoming secretary of the Highway Industries association. Recently he turned from this work to his profession when he again accepted the office of road engineer of Baltimore county.

Associated with Mr. Shirley on the A. A. A. road board will be M. O. Eldridge, formerly assistant director of the Bureau of Public Roads.

New Apollo Magneto

Designed for Four-Cylinder Engines but Easily Adapted for Use with Two or Six-Cylinder Engines—Rotates in Either Direction.

THE executive personnel of the Apollo Magneto Corporation, located at Kingston, N. Y., has been for years engaged in the manufacture of high-grade and intricate machine parts. The engineers and heads of the manufacturing departments have been actively connected with the magneto business both in this country and abroad for a period of over 15 years. Their broad experience in the magneto field has enabled them to design an instrument which, it is claimed, has proved superior in many respects.

The present factory was built and equipped during the latter part of 1919, in accordance with the latest factory developments, and equipped with the most modern machinery obtainable for magneto production.

This company is an outgrowth of the Magneto Winding Co., which was originally organized in 1918.

THE Apollo magneto is of the high-tension type, constructed along conventional lines to meet the demand for a thoroughly built, high-class instrument. Careful design and good materials have been combined with expert workmanship to produce an efficient device which is simple and compact.



The Apollo Magneto is a Compact, Water-Proof High-Grade Unit of Electrical Energy.

The Apollo magneto is primarily designed for use with four-cylinder engines and for rotation in either direction. It may, however, be easily adapted for use with two or six-cylinder engines by a simple alteration of the interrupter, requiring no additional parts, which makes the change from clockwise to counter-clockwise or vice versa. Two additional parts fit the four-cylinder magneto for use with a two-cylinder engine, while seven additional parts are required to adapt it for service with a six-cylinder engine.

Construction of the Housing.

The housing is a one-piece aluminum die casting while the pole pieces are laminated and cast integrally with the housing. This allows them to be made of special sheet iron with a greater magnetic permeability than otherwise and permits a better distribution of the flux. By this method, retaining screws and pins are eliminated, reducing the reluctance in the poles. All internal machine operations are performed at one setting with a built-up tool, and the accuracy obtained allows a minimum air gap between the poles and the armature, thereby increasing the efficiency of the magneto. Brass inserts are used wherever necessary in building up the die castings.

The magnets are of the U-type, made of the highest grade tungsten permanent magnet steel and by manufacturers who have been for years specialists in the manufacture of permanent magnets.

The Apollo armature is wound on a laminated core, using enamelled magnet wire to form the coils. This method allows a closer winding, increasing the efficiency of the magneto. The armature assembly includes the core, winding, plates and condenser.

The condenser, which is located in the base, is fastened by one bolt which passes through and grounding it, thus forming a positive ground connection and avoiding a common source of trouble from a loose condenser connection which is hard to get at. In addition, there is another bolt which passes entirely through the condenser, which is insulated and used to securely anchor the condenser in the housing. The condenser is so proportioned in size as to permit a slight sparking at the points, sufficient to keep them in good condition without burning.

The slip ring is composed of hard rubber in which is cast a brass contact ring. It is made exceptionally thick through the center section with a recess at either side of the contact face, making it practically impossible for the spark to jump across and damage the ring.

The end thrust of the armature is not in any way taken by the slip ring as a shoulder is provided on the cam end plate for this purpose. One side of the cam end plate shaft is made flat at the point where the slip ring is retained, for the purpose of giving extra thickness to the slip ring at the point where the high-tension connection is made.

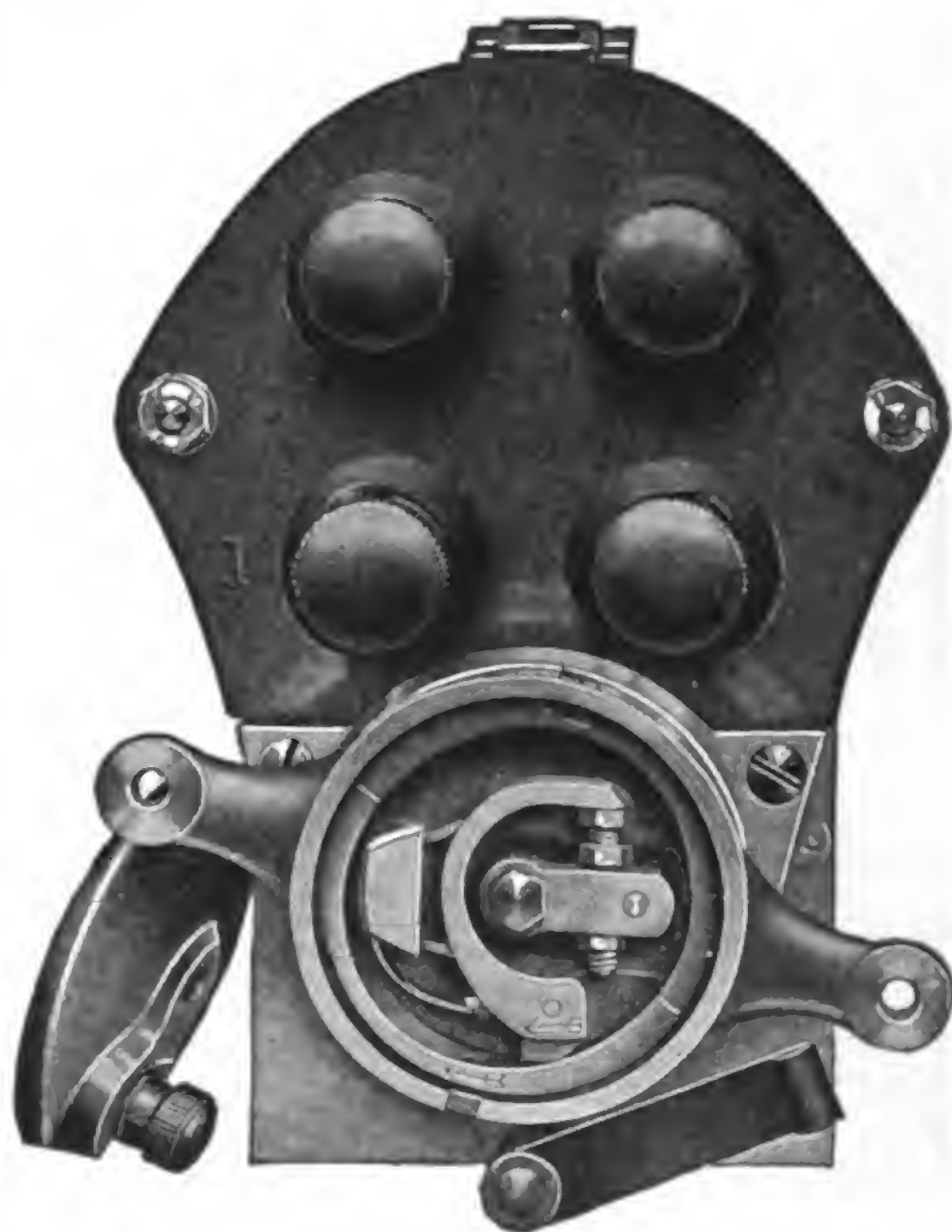
The safety spark gap is obtained by the proximity of a rib on the triangular end plate to the slip ring contact. As it is thus an integral part of the magneto, all chance of damage through its omission or alteration is obviated. The gap is set at $\frac{3}{8}$ of an inch.

Distributor Is of Hard Rubber.

The distributor is made of moulded hard rubber compound, while all brushes are of the same size and the large gear is made of micarta and is noiseless and durable.

The interrupter of the Apollo magneto contributes largely to its sustained hot spark. The points open in parallel relation to each other, thus assuring permanently an even contact surface with no excess sparking. The interrupter cam, which is of steel, hardened and ground, is so designed as to allow the necessary rapid opening of the points, and permits them to close more gradually than is customary, thus eliminating the hammering effect. Its lubrication is accomplished by the overflow from the end bearing lubrication. The statement is made that the elimination of the hammering on the points and of excessive sparking, and the further fact that the cam contact is lubri-

(Continued on Page 558.)



Apollo Breaker Points Accessible for Cleaning, Adjusting and Fitting New Points.

Truck Engine Troubles

Easily Traced to Source by Process of Elimination—Neglect of Small Matters Often Leads to Heavy Expense and Long Delay.

(By RICHARD EVANS.)

EVERY present or prospective motor truck owner, driver or operator can read, with benefit, the following article, which is written by an acknowledged expert on automobiles, their construction, care and repair, as he treats his subject in a simple, non-technical way. Mr. Evans, the author, has been intimately connected with the automotive industry since 1901, during which time he has personally supervised the renovation of nearly every type of automobile and truck engine made in this country. He has spent three years working at various factories in England, and was for a time connected with the engineering staff of a well-known car manufactory in Germany. At the present time he is engaged in research work.

HOW many times during the course of the year do car owners call on the garage men to restore the lost power of their engines. There is hardly a garage owner who operates a repair shop, in connection with sales, a storage and service, but has been called on by customers for this type of work, yet much of this could be done by the owner. First he must study the contingent units, defects in the operation of which may cause loss of power. Many reasons can be given for this state of affairs, chief among which may be mentioned the following, which in nine out of 10 cases, if followed through in a systematic manner, will usually eliminate the trouble. They may be summarized as follows:

Poor compression; too weak or too rich a mixture; operating in high altitudes; weak spark; ignition timed too late; running with spark retarded; valves

not timed correctly; valve tappets not adjusted properly; valves not seating properly; lack of lubrication; lack of cooling water; lack of gasoline; dragging brakes; slipping clutch; choked muffler causing back pressure.

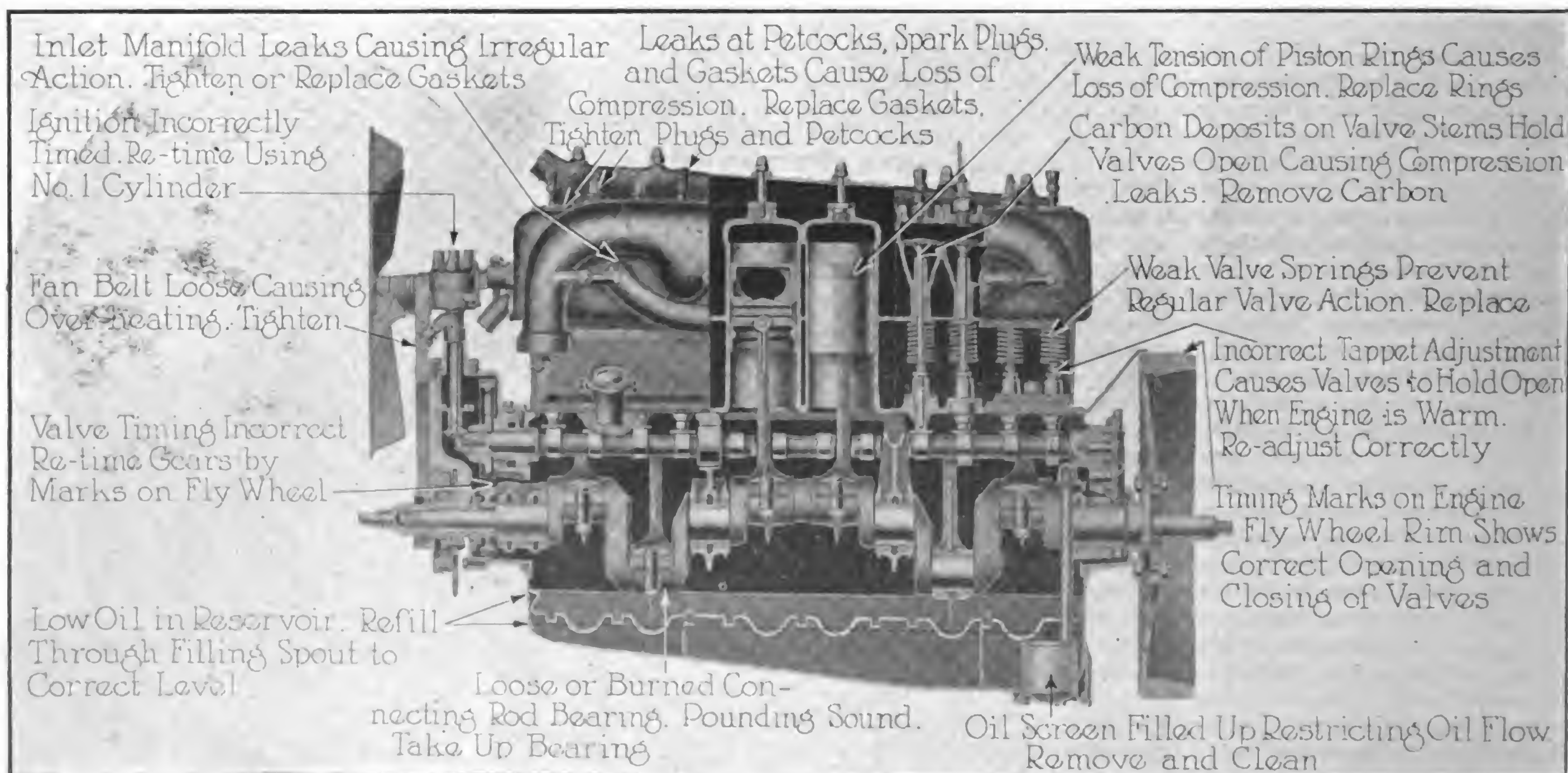
Poor Compression.

Poor compression is one of the common causes for lack of power. Unless the compression pressure is sufficiently high, the explosion will be lacking in force and the power of the engine will be weak. A simple manner by which the engine compression may be noted is by turning the engine slowly by hand, with the ignition off, throttle wide open, and the compression observed in each cylinder; or a more accurate way is to remove the spark plug and screw in a small pressure gauge, which should indicate from 60 to 80 pounds at the end of the compression stroke, depending on the make of engine. Loss of compression is commonly due to

leaky or improperly seated valves, or to leaky joints. Leaky thread joints, valve caps, or cracks in the cylinders are also all common causes of loss of compression.

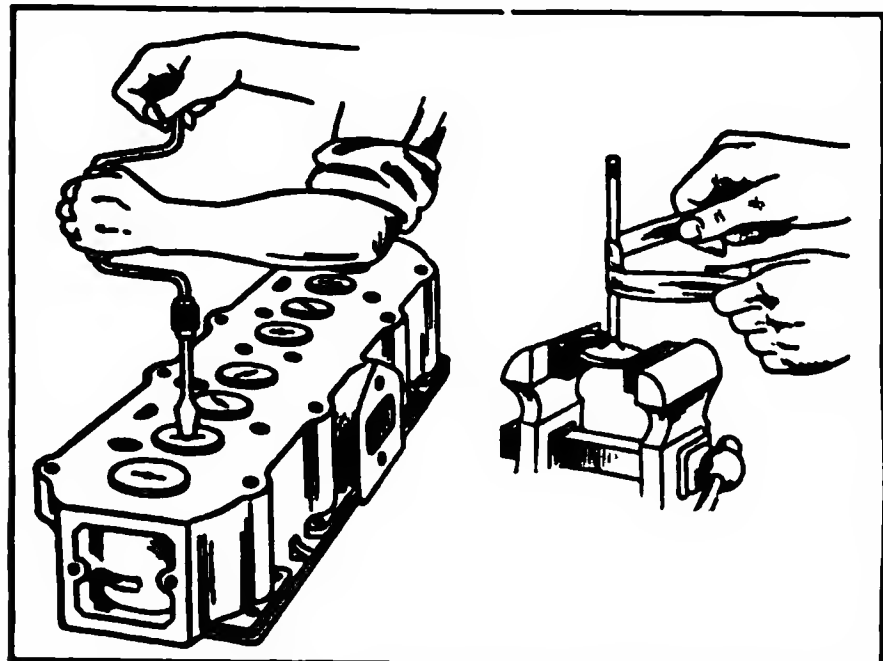
These can be detected by a hissing sound or, if the suspected leak is covered with gasoline or oil, the leak will show itself by bubbles arising through the oil. If the trouble cannot be located in this manner, attention should be given to the valves.

As a rule, the intake valve requires less attention than the exhaust, because the former comes in contact with the cool, fresh fuel charges, whereas the latter is apt to become fouled and burnt by the hot and dirty exhaust gases. A frequent source of leaky valves is carbon deposit on the valve seats. These deposits prevent the proper seating of the valves, the remedy being to clean and grind them. Still another cause is a shoulder on the upper edge of the valve face. This is



A Few of the More Important Engine Troubles Are Here Illustrated, Together with the Remedy for Each—Locating the Trouble Is Often Difficult, Especially If It Is Indicated by a Noise—Sound Is Transmitted by Metal Connections and Often Confuses the Repairer.

usually the result of frequent grinding, which makes a depression in the valve face, the lip or edge preventing the valve from seating to its full depth on the bevel, causing the valve to be held in a partially open position. Weak compression results and blackening of the seat and valve face with carbon follow.



Invert Cylinder When Grinding Valves—Remove Carbon Deposit on Valve Stem with Emery Cloth.

Grinding Valves.

Valves that are found in this condition should be refaced before regrinding to insure their seating properly. Often the seat, in which the valve positions, is pitted or ground so deep that the valve will not seat properly. Valve seats that are in this condition should be refaced with a special reseating tool which cuts a new seat corresponding to the bevel of the valve face. The valve and seat may then be reground with every assurance that the valves will fit gas tight, provided that the regrinding is properly performed.

A simple, easily arranged valve refacing tool which can be made by the home repairer consists of a small, high-speed hand drill having a chuck for the shank of the drills that will open sufficiently to allow the valve stem to be inserted. Clamp the hand drill in a vise lengthwise and place the valve in the chuck, setting the chuck up tightly. Take a large mill file about 12 to 14 inches long and drive the tang of the file lightly into the bench, slanting it slightly and turned in such a manner that it will correspond with the original bevel of the valve face. Turn the valve briskly with the handle of the drill bearing the file against the bevel face of the valve. Continue this until the edges are ground down to a level with the center and the center smoothed up. Remove the valve and grind in the valve seat. In trueing the valve seat special cutting tools are available at a small cost, which can be operated in a bit stock.

For grinding the valve there are several good mixtures on the market, prepared ready for use, or requiring the addition of light oil to form a soft paste. Compounds of this nature are composed of two grades, light and coarse, each grade being separate either in each end of the box in which they come or, when dry, in separate containers in the same box.

Method of Procedure.

First, coat the valve face lightly with the coarse grinding abrasive, place the valve in its seat and rotate with a valve grinding tool, which may be purchased or home made. Many repairers use a screw driver for this work, rotating it between

the palms of the hands. Still others prefer to use a bit brace, moving the valve a complete turn in one direction and then reversing it. The bad feature of the bit brace is that too much pressure may be applied and the abrasive prevented from cutting. A light pressure should be applied and every few moments the spring should be allowed to lift the valve from its seat, permitting the fresh abrasive to work in so that it will continue to grind. After cutting effect of the abrasive has been exhausted the valve should be removed, the old abrasive wiped from the valve face and seat and fresh abrasive supplied. Valves that have been refaced and the seats refaced do not require lengthy regrinding as a rule, and after a clearly defined ring is shown on the valve face, grinding with the coarse abrasive should stop, and the job finished with the fine abrasive. The fine abrasive smooths down the ridges and makes a gas tight fit between the valve face and the seat. After the grinding operation is finished, the seating of the valve may be tested by applying a little Prussian blue to the valve face and rotating lightly by hand to coat the face of the seat. Remove the valve and wipe the Prussian blue from valve face and place in the guide again turning the valve lightly in its seat. High spots on the valve face will be denoted by the Prussian blue and further grinding will be necessary to remove them.

In grinding clean the parts carefully after each operation to prevent the abrasive from reaching other working parts such as the pistons or cylinders, as the abrasive, if allowed to remain on the parts, will continue to cut into the metal and will cause future damage. It is always a good plan to stuff a piece of waste in the open cylinders to prevent the abrasive from entering. Be sure to remove it again before replacing the cylinder head. Similar operations are performed when regrinding valves held in cages, only in this case the cage is removed and ground at the bench as the valve stem can be held in the vise jaws, simplifying the

work. Valve ground in L or T-head engines not having removable heads are ground through the ports above, using a valve grinding tool or screw driver. A wad of waste should be inserted between the valve seat and the opening into the top of the cylinder to prevent abrasive from working through on to the piston, and should be removed after the grinding is finished.

Valve Adjustment.

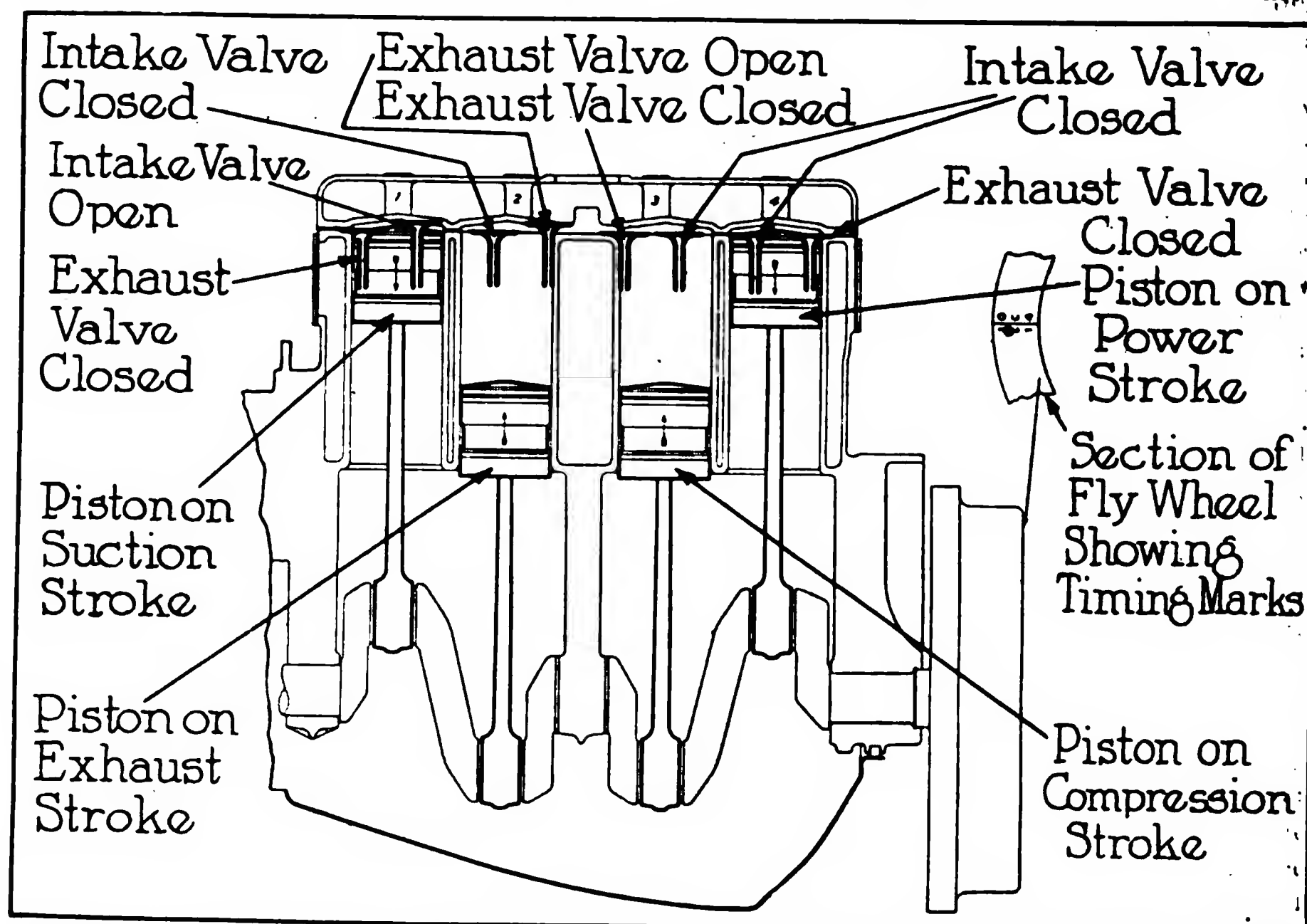
Poor adjustments of the valve-operating mechanism may often cause poor compression, even if the valve seats have been properly ground in. The valve spring may be broken or too weak to close the valve on its seat in the proper time. Sticking of the valves when opened may also cause low compression.

The clearance between the valve stem and push rod may be the cause of considerable trouble. The clearance is usually about the thickness of a thin visiting card, the exact amount being somewhat different for different cars, but in no case is it greater than $1/32$ of an inch. Testing the clearance should only be attempted when the engine is warm, for if adjusted when the engine is cold the valves will hold open when the engine is warmed up, due to the expansion of the metal.

If this clearance for the intake valve is too great the lift is reduced, thus preventing the proper charge from getting into the combustion chamber of the cylinder. If the exhaust valve lift is reduced in the same manner it will be more difficult for the exhaust gases to escape. Too much clearance also changes the time of the valve opening and closing, causing them to open late and close early. If, on the other hand, this clearance is too small or entirely absent, the valves will open early and close late, or will not close on its seat.

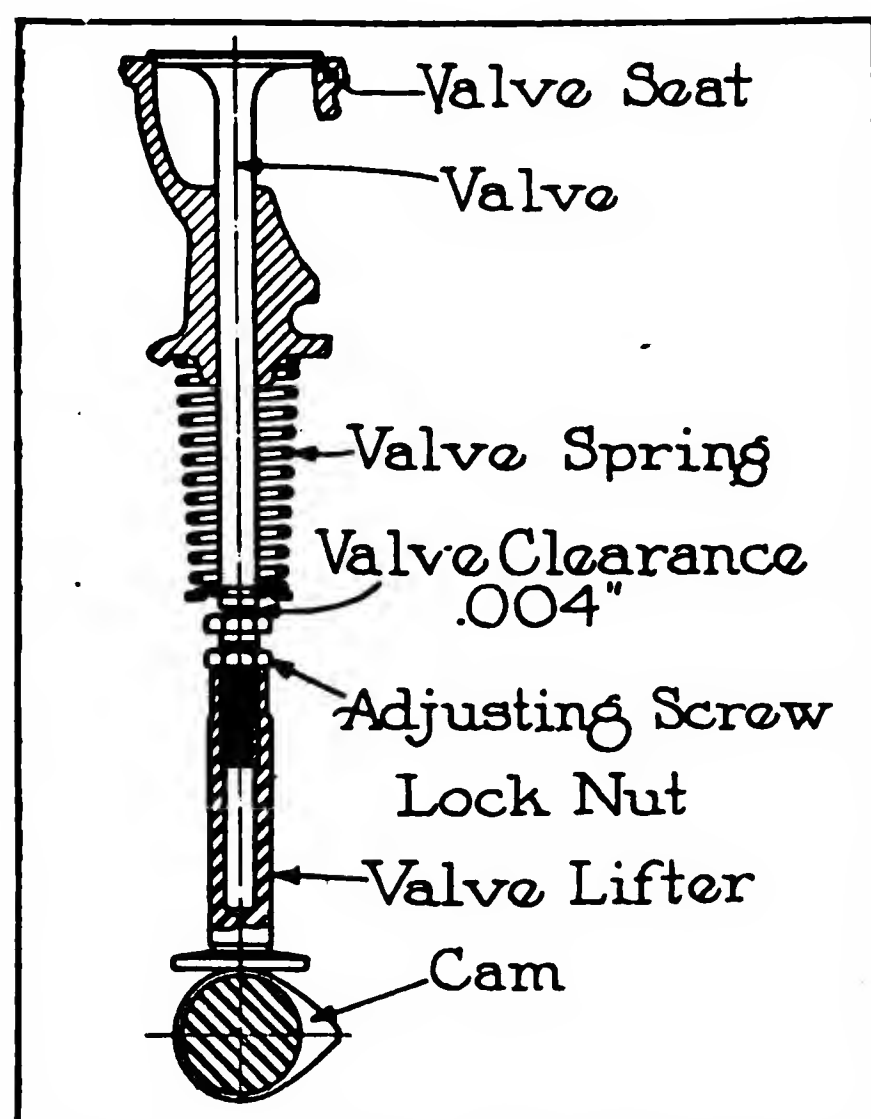
As the valve seats are lowered by continual grinding, the clearance is gradually changed. For the proper operation of the valves, careful attention should be given to this clearance space.

A weak spring on the exhaust valve



Sectional View Showing Four-Cycle Engine, Indicating Piston and Valve Action with Relation to Valve Opening and Closing Positions Marked on Fly Wheel.

may have a marked effect on the operation of the engine. The exhaust valve will then open on the suction stroke and burnt gases will again be drawn into the combustion chamber.



Correct Valve Clearance Between Tappet and Valve Stem Gives a Quiet Operating Engine.

Valves Improperly Timed.

Improperly timed valves will cause poor compression and lack of power. The valves are adjusted at the factory and the necessity for changing the timing comes as the result of wear on the valve seats, stems, rods, cams, half-time gears, or by the improper replacement of any of these parts. If the cam shaft has been removed care must be taken to mesh the gears properly when replacing it. The gears are marked so that replacement is not difficult. It will be noticed that there is a prick punch mark on one tooth of the pinion usually and a corresponding mark on the larger gear, or there are two on the larger gear and the single mark on the pinion gear meshes between the two. Before removing a cam shaft examination should be made and if the gears are not so marked it should be done.

If the clearances are properly adjusted for the push rods and valve stems and if the timing gears are properly meshed, the valves should be correctly timed, making allowance for wear on the cam faces. On most engines the positions at which the valves start to open and close are marked on the circumference of the fly wheel. These points should be opposite the pointer, usually at the top of the case, when the valves start to open and close. This time can be determined by the use of a thin sheet of tissue paper. By placing a piece of paper in the clearance space between the push rod and valve stem, one can tell when the valve opens or closes.

Valve setting is an adjustment that should be made by an experienced mechanic or one thoroughly familiar with the principles of the four-stroke engine. The different manufacturers have found by trial the settings that will give the best results with their engines and cars. These settings vary somewhat according to different conditions. If they are not marked on the fly wheel rim they should

be obtained from the manufacturer.

The inlet may open anywhere from top center to 20 degrees of fly wheel motion after center. The inlet closes from 25 to 50 degrees past lower center. The exhaust opens 35 to 60 degrees before lower center and closes from top center to 15 degrees past center.

Too Rich or Too Weak a Mixture.

A rich mixture can be detected by black smoke coming from the muffler, and by the overheating and missing of the engine. Not only is fuel wasted, but the cylinders become fouled and carbonized. A mixture which is too rich at slow speeds can be corrected by cutting down the gasoline, and at high speeds by increasing the auxiliary air. An auxiliary air spring which sticks, a restricted air opening, or a flooded carburetor will cause an over-rich mixture.

A weak mixture can be detected by back-firing through the carburetor and by occasional muffler explosions. A weak mixture, being a slow-burning mixture, is still burning when the intake valve opens for the following charge. This permits the flame to shoot back through the manifold into the carburetor. A weak mixture should not be confused with an improperly timed intake valve which opens before the burning charge has been exhausted. If the intake valve has a weak spring, which does not close the valve properly, it may permit back-firing through the carburetor. The back-firing caused through valve trouble is usually more violent than back-firing due to a weak mixture. A weak mixture at slow speeds is generally caused by too little gasoline and at high speeds by too much auxiliary air. The carburetor should be adjusted accordingly.

Air leaks in the manifold connections will dilute the mixture with air and cause a weak mixture and back-firing. These leaks should be closed before the carburetor adjustments are made.

A stuck, bent or obstructed gasoline needle valve may cause a weak mixture by shutting off the supply of gasoline. The remedy is obvious.

Operating in High Altitudes.

Operating cars or trucks that have been properly set at the carburetor to work satisfactorily in low altitudes will

show a marked loss of power when high altitudes are reached. Cars equipped with choker devices can work fairly satisfactorily without making a change in the carburetor adjustment, but those not so equipped will need to have the carburetor needle valve opened slightly and the auxiliary air valve tightened to work successfully in the higher altitude. The carburetor will have to be reset when the lower levels are again reached to get the utmost economy from the engine in ordinary low level driving.

Weak Spark Caused by Defective Wiring and Ignition.

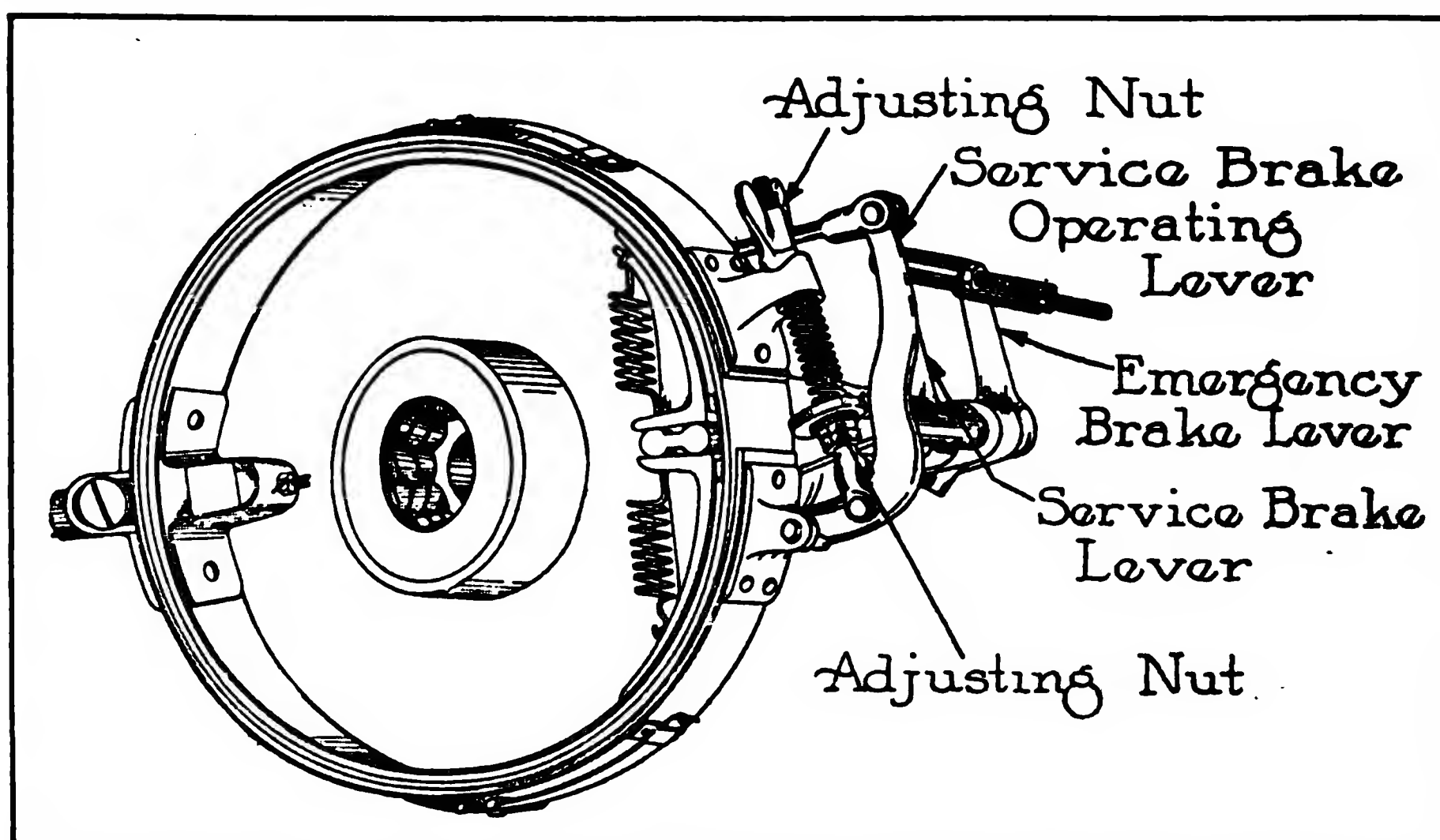
If the plugs are found in good order, and yet one or more cylinders continue to misfire, the trouble may be due to a lack of secondary current in the wire connected to the plug, often termed the plug terminal wire.

The trouble can usually be detected when the engine is running, or being cranked, by detaching the wire from the plug and holding the end about one-eighth to one-quarter of an inch from the plug binding terminal or cylinder head. If the secondary current is being distributed properly to the cylinder under test, a spark will occur at the gap. If there is no spark across the gap and there is regular sparking at other plugs, the trouble is undoubtedly due to defective high-tension wiring, a cracked distributor head or poor timer contact.

If the rubber covering or insulation on the spark plug terminal wires is chafed or cut through, allowing the conductor to touch or nearly touch any metal part of the car, the current will be short-circuited and will not jump the gap in the plugs. It is not necessary that this insulation be worn down to the metal of the conductor. If a sharp snapping is heard when the engine is running under a heavy pull it is evidence of a short-circuit from the high-tension conductor to the frame. The fault will usually be found due to imperfect insulation of the spark plug wires, or a wire loose from the spark plug terminal. The only satisfactory remedy for cracked insulation is to replace the wiring with new.

Irregular Misfiring Due to Defective Wiring.

The irregular misfiring of all cylinders



Brakes Should Operate Freely Without Dragging—Frequent Adjustment Necessary to Keep Them in Good Working Order—Should Be Relined If Worn Excessively.

may be due to defective primary wiring, a discharged battery, a weak magneto, corroded or loose battery connections, improper adjustment of vibrator or interrupter contact points, or a defective condenser.

A common cause for irregular misfiring, when the ignition is from a battery high-tension distributor unit, is improper make-and-break of the primary circuit by the contact points. In a majority of the various systems employed, the contact points are made of tungsten and held closed by spring tension, the spark occurring the instant the primary circuit is broken by the cam lobe bearing against the contact arm. The contact points have a standard opening of .17 to .020 inch, about the thickness of two United States post cards. If found dirty or uneven and pitted, they should be cleaned by passing a fine flat file, or preferably a piece of No. 00 sandpaper between them.

How a Defective Condenser Is Indicated.

A defective condenser is indicated by serious sparking and the rapid burning of the interrupter or vibrator contact points, also by the inability of the coil to produce a hot secondary spark when the primary circuit is interrupted. If these conditions exist, the condenser is probably either punctured (insulation between tinfoil layers destroyed) or open-circuited. The best remedy is to replace the condenser, or the unit in which it is contained, with another that is known to be good. If the condenser is mounted inside the coil, the entire coil usually must be replaced. However, when the condenser is mounted in the breaker housing it can usually be replaced without disturbing the other parts of the system. The action of a good condenser results in intensifying the secondary current nearly 25 times and preventing an arc at the breaker points when they are separated.

Resistance Unit in Primary Circuit.

In many battery ignition systems, a resistance unit is placed in the primary circuit to protect the coil and battery in case the ignition switch is left on, and to aid in equalizing the intensity of the secondary spark at high and low engine speeds. In case the resistance unit should burn out, or for any other reason become open-circuited, the primary circuit is

opened and no current can be obtained at any of the plugs. This resistance unit consists of a small coil of iron wire and is usually placed either on the coil or breaker housing. In case this resistance unit should be burned out or accidentally broken, the terminals may be temporarily short-circuited with a piece of wire to relieve an emergency, but in all such cases the resistance unit must be replaced with another of the same kind as soon as possible. Continued operation without it will result in serious burning of the interrupter points and may cause injury to the coil and condenser.

No Current Due to Coil Trouble.

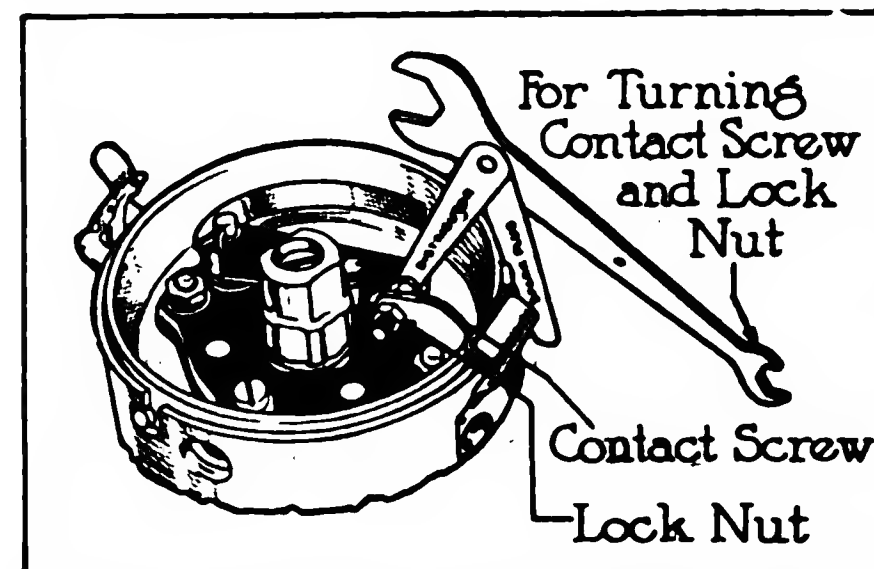
A frequent cause of no current at the plug is due to coil trouble, especially where a vibrating coil is used for each cylinder. When the vibrator points become pitted, out of line, or burned, good contact is impossible. The tension on the vibrator springs may also become changed, permitting the coil to consume too much or too little current.

In the case of burned or pitted points, they should either be made flat with a thin, smooth file, or preferably a piece of No. 00 sandpaper passed between them. In either case the points should be shaped so as to meet each other squarely.

If it becomes necessary to adjust the tension on the vibrators, the tension should be entirely taken off and gradually increased until the engine runs satisfactorily under all load conditions with the coil consuming as little current as possible. It is very important to have all of the units adjusted alike. This can be easily done after a little experience. The most accurate method of coil adjustment is with a coil current indicator by which the amount of current consumed is measured. Coils are constructed to consume about one-half to 1½ amperes; consequently, the tension should be adjusted so that the current consumption of each coil is not much greater than this amount.

If no current is obtained in the secondary circuit of a coil when the vibrator is working as it should, the trouble is probably due to either a broken wire or punctured insulation inside of the coil. It sometimes happens that the binding post wires become loose from the post just inside the coil. If only a slight spark

can be obtained, the insulation on the inside wire may be broken down, thus causing a short-circuit. Obviously there is no remedy but to replace the coil. Moisture in the coil may also cause it to become short-circuited. In this event the coil should be thoroughly dried out before it is put back into service.



Special Gauge Required to Set Points in Breaker Box for Correct Spark Gap.

Ignition Timed Too Late.

Another cause of lack of power is late timing. Trouble in the timer is usually due to oil, water or dirt which has gotten into the housing, causing either a short-circuit or poor contact. This foreign matter should be cleaned out of the timer in order to permit it to give good service. After a time the contact segments in the timer become worn and irregular, causing misfiring at high speed. In this event it will be necessary to supply a new timer.

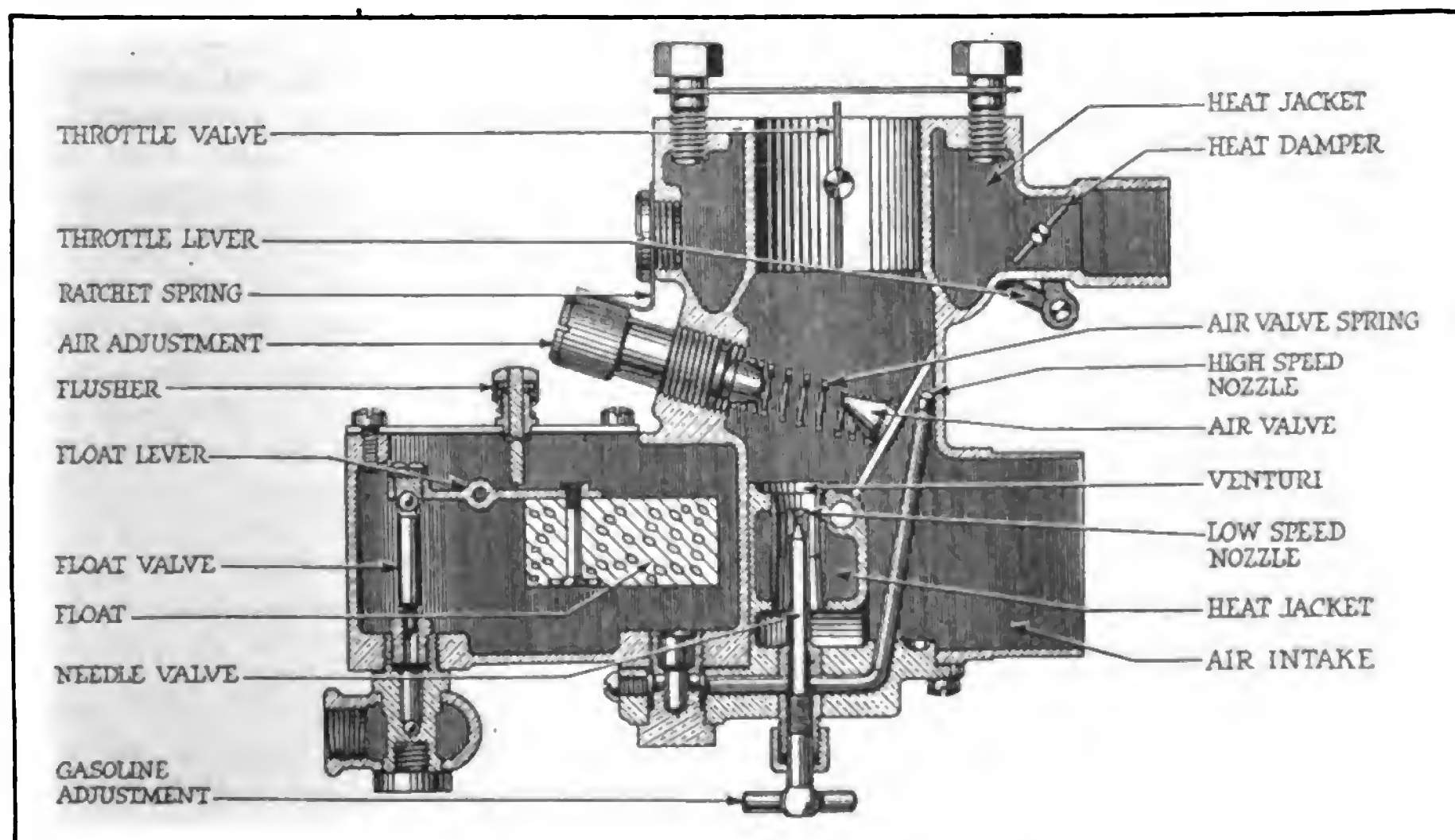
If the engine kicks back after cranking the spark is too far advanced and should be retarded so that it will not occur until the piston has passed the dead center. The tendency of an early spark on starting is to cause the engine to start backward. Too early a spark at low speeds will make the engine knock and will cause the car to jerk.

A retarded spark causes the engine to overheat and lose considerable of its power. There is no advantage gained in retarding the spark past center, even in starting. When the engine is running, the spark should be advanced in proportion to the speed. With the spark lever fully retarded, the interrupter points should be timed to open (thus causing the spark) when the respective pistons are on upper dead center at the end of their compression strokes.

On cars equipped with automatic spark advance, the troubles due to early and late spark are seldom experienced, providing the original timing of the spark was correctly made. Preignition from other causes, however, may occur with either type of spark advance.

Lack of Lubrication.

The lack of sufficient lubricating oil or the presence of too large a quantity will cause loss of power which is often hard to trace. The usual lubricating troubles are due to the use of the wrong kind of lubricating oil or too much or too little of it. An engine with loose-fitting pistons requires a heavier oil than does one with tight-fitting pistons, and an air-cooled engine usually requires a heavier oil than a water-cooled unit. It is very essential that a true gas engine cylinder oil be used for cylinder lubrication because it alone satisfied the requirements. Poor lubricating oil is expensive at any price, and it is good economy to use the best



Sectional View of Marvel Carburetor, Indicating Units and Adjustments—Common Troubles Caused by Dirt or Dust in Fuel—Clean Strainers in Fuel Line.

cylinder oil obtainable. In this matter the recommendations of the manufacturer should be followed.

An excess of lubricating oil shows itself by a white bluish smoke coming from the muffler. In addition to this, an excess of lubricating oil causes the formation of a pasty carbon deposit in the combustion chamber, which eventually causes the engine to overheat.

The important things to look after are to be sure that there is sufficient supply of oil and that the oil pump is in working order. The crank case should be drained, washed out with kerosene, and new oil supplied every 1000 miles of travel.

Lack of Cooling Water.

Poor circulation in the cooling system is one of the common causes of loss of power and when neglected is liable to give the motorist many uneasy moments. The water system must be kept filled with water. This is of special importance in the thermo-syphon system, in which the water level must at all times be above the top of the return pipe from the engine to the radiator in order to have the circulation complete.

A worn pump may cause poor circulation, because in most cases the thermo-syphon effect in a forced system of circulation is not enough to keep the water moving at the proper rate.

Sediment in the radiator and scale in the engine jacket may interfere seriously with the circulation of the water. Such clogging of the system comes from the heating and cooling of the impure water used. This emphasizes the desirability of using pure water or rain water in the radiator. The sediment and hard scale may be removed as follows: Open the drain cock in the bottom of the radiator and introduce the end of a hose in the filler of the radiator. Run the engine for about 15 minutes. The fresh water from the hose will clean out the loose sediment and scale in the water jackets and radiator. By using this method a supply of fresh water is constantly entering the system and passing through the water jackets while the engine is running.

Next, put as much ordinary washing powder as can be dissolved in the water necessary to fill the radiator. Then run the engine with a retarded spark until the water is heated to the boiling point. Allow this solution to remain in the engine and radiator for several hours, after which open the drain cock and with a hose, again flush out the entire system with fresh water as before. In extreme cases it would be well to repeat this process several times. The final operation of flushing out with fresh water should be thoroughly done. If any of the washing soda solution is left in the engine jacket or radiator, an undesirable chemical action may result.

When rubber hose forms a part of the circulating system, a kink or twist in the hose may possibly result in the poor circulation of the water. The inside fibers of the hose also tend to become loose and may clog the system.

In the case of thermo-syphon cooling systems, or air-cooled engines, the operation of the fan is essential to the successful operation of the cooling system.

If the fan belt breaks or slips, or the fan blades are bent, the air circulation through the radiator is interfered with and, consequently, the water is not properly cooled.

Lack of Gasoline.

Loss of power through lack of fuel is a common occurrence which indicates itself by a popping sound in the carburetor and the irregular operation of the engine. The car will forge ahead for a few feet, the engine will fire irregularly, spit back into the carburetor and eventually come to a stop. If at a distance from a garage where fuel is sold, stand on the running board on the carburetor side and rock the car; this will fill the carburetor float chambers, if a gravity system is used, sufficiently to run the car for a short distance. The gasoline feed pipe usually leads out from one end of the fuel tank and some of the liquid is usually found in the opposite end, tipping or rocking the car allows this fuel to run through the feed pipe and to fill up the carburetor bowl. Lack of gasoline may also be caused by an obstruction to the flow in the strainers of the fuel line or to specks of dust under the needle valve. Removing the strainers and cleaning them will remedy the former and turning the needle valve down on its seat several times will grind out the dust particles in the latter.

When the vacuum system is used and the flow of gasoline stops, the cause may be usually traced to some fault in either the fuel line leading from the main tank in the rear, a clogged opening in the tank cover, or to some local trouble in the vacuum tank.

Examine the fuel line from the main tank to the vacuum tank, removing kinks in the pipe, if found, and testing all joints to see that they are tight. Remove the cover on the main gasoline tank and run a wire through the air opening in the cover so that air may enter the tank as the gasoline is drawn out. Remove and examine the strainer on top of the vacuum tank as this may have become clogged with lint, etc., from the main tank.

If the trouble is traced to the vacuum tank itself and one is positive that the trouble is here, remove the interior mechanism of the tank and examine the flap valve at the lower end of the top, making sure that it seats properly and that the seat is clean.

Dragging Brakes.

Relined brakes or brakes that are set too close are a source of lost power, which soon causes overheating and the power of the engine to apparently lag. It is necessary that the brakes be kept in perfect working order at all times. If the brakes fail to hold it may be that the drum and band facings have become covered with oil and dirt, or the band facings may be worn. In the latter case new facings are necessary in most cases, but adjustments can be made for slight wear.

The brakes may bind or stick, due to too tight adjustments. With tight adjustments, the engine pulls the car against the friction of the brakes.

If the brakes are not adjusted equally on each side of the car there will be a tendency to skid when the brakes are applied. The braking effect then comes on

only one wheel and this tends to swing the car around. Many cars are provided with brake equalizers, which require them to work together.

Slipping Clutch.

Clutch troubles are about the same in either the cone, plate or multiple-disc types. The clutch either slips, engages harshly, grabs or refuses to release. If it slips the full power of the engine is not transmitted and the clutch becomes hot from friction. In the cone and dry-plate types, a coating of oil on the facings will cause slipping. Wear of the facings or weak or broken springs will produce the same result. If the slipping is caused by grease and dirt the clutch leather should be thoroughly cleaned with gasoline, after which, if the clutch still slips, fuller's earth may be applied or the clutch adjusted. If wear is present in the facing of the clutch the simplest method of restoration is to remove the old facing and replace it with new.

If the clutch engages too harshly or grabs suddenly it may be due to the drying out or hardening of the clutch leather. A dressing of the facing with neat's-foot or castor oil will make it soft and permit gradual engagement. If the clutch springs are too tight the clutch will drag and burn the facing. If a multiple-disc or plate clutch is designed to work in oil, it will engage harshly or grab if the plates become dry. The clutch will also fail to disengage when the pedal is pressed down.

Multiple, dry-disc clutches will slip if the foot is allowed to rest on the clutch pedal. A light clutch spring is used with this type, the discs being held in position more by the friction of the friction facing than by the tension of the spring. Riding the clutch pedal is to be avoided in this type, and if the slippage is too great, causing the engine to race when travelling over a grade, the clutch can be adjusted by means of the three clutch adjustment bolts that hold the clutch plate assembly.

If the change gears stick, when an attempt is made to shift from one speed to another, the shifting members may be stuck on the splines of the shaft. If the gears have become burned or teeth have been broken out, the particles of metal may prevent the movement of the sliding member. Occasionally the shifting lever becomes stuck and will not operate the gears. Under ordinary conditions the change gears should make very little trouble if due attention is given to the lubrication, and to their shifting in operation.

Choked Muffler Causes Back Pressure.

The use of the muffler causes a slight reduction in the power of the engine because the pressure against which the gases must enter into the exhaust manifold is increased. A muffler is a chamber in the exhaust pipe which receives the gases from the engine and expands them gradually into the outside air, thus preventing a loud noise.

Oily carbon deposits from the engine combustion chambers form on the baffle plates of the muffler and the drilled holes in the plates gradually fill, choking the free passage of the gases and causing increased back pressure.

PRACTICALITY OF TRACTOR POWER

Large Numbers of Farmers Interested in Demonstration of Fordson Caravan—Visits 11 Counties in State of Washington

(By W. H. GOODWIN, Assistant Manager, Seattle Branch, Ford Motor Car Co.)

THE idea of the Fordson Tractor Demonstration caravan suggested itself to us shortly after we had met with the representatives of the Washington State college and the Northern Pacific and Great Northern railways. Invitations had been sent out by them to all parts of the northwest inviting manufacturers and distributors of power farming machinery and stump pulling devices, powder concerns and ourselves to join with them in a tour which was to cover 11 counties of western Washington. Their idea was to give practical demonstrations of the various devices on a strictly educational basis, leaving it to the participating concerns to follow for sales at the completion of the tour. Meetings were held, at which time representatives of those who had been invited to participate were present, but it was apparent from the outset that the plan, while a worthy one indeed, was not to materialize. In fact, there were so many withdrawals from the proposed undertaking that, after a final check of those who wished to continue it was found that the Skagit Steel & Iron Works of Sedro Woolley, Wash., manufacturer of the stump puller; the Dupont Powder Co., and ourselves were all that remained. Even then we were anxious to go ahead with the proposition, but Dean Nelson of the college stated that it would appear as though it was a private undertaking and, as their object was purely one of education, they consequently could not lend their support. The whole plan, however, offered such unusual opportunity for interesting the farmers and owners of logged-off land that we decided, after considering the matter from all angles, that if it could be worked out we would have a land-clearing and power farming demonstration tour of our own, and in addition cover two more counties, making 13 in all.

The original idea of the college and railroad representatives was to take their equipment through the territory on

flat cars, which meant that they would touch only the larger towns and more thickly settled communities. This, of course was all right, but we determined that, in addition to visiting those communities, we would take in the smaller and more isolated districts as well, with the idea of presenting the modern power farming idea just as thoroughly as possible to all the territory covered.

Difficulties to Be Overcome.

At the outset there were many difficulties which had to be overcome, of which the principal one was the impracticability of driving tractors equipped with the regular farm wheels over paved roads, and so it was necessary to secure rubber equipment. We were fortunate in being able to secure this equipment through the good work and assistance of the L. M. Cline Motor Co., one of our Seattle city dealers.

The next problem was to secure trailers of sufficient size and durability to permit of their carrying the heavy loads which would be placed upon them. For this purpose we used Ford one-ton truck chassis without motor, dash or steering post. The rear axle was the complete rear system without drive shaft. On these chassis were placed platforms made up of four-inch by six-inch sills and two-inch by 12-inch planks, and when connected up with the tractor by a special tow bar the complete outfit made an ideal trailer. In all there were 10 of these special trailers and on them were placed all the farm and industrial equipment which it was possible for the implement distributor and ourselves to secure.

The problem of having a supply of fuel and oil at all times was taken care of by the Standard Oil Co., who furnished us with a large tank wagon, which was drawn by a tractor equipped with a Cole line drive, enabling the driver to operate the tractor from the seat of the tank wagon. This, of course, was a source of

a great deal of interest and amusement wherever we went, for with the Cole drive it was possible to change gears and steer the tractor just as easily as though the driver had been operating it in the regular way.

Featured Stump Pulling.

In order to create the greatest amount of interest we gave all possible publicity to the stump-pulling feature of our demonstrations, as the logged-off land problem in western Washington is a very great problem indeed. We knew that if we could show by the use of the tractor in connection with a practical attachment that land could be cleared quicker, better and more economically than in any other way we could arouse the required interest throughout the territory which we planned to cover. The Skagit Steel & Iron Works cooperated with us in every possible way, constructing a special outfit which could be moved about on large wheels. They also furnished us a crew of men to operate the outfit.

In order that stumps may be pulled properly it is necessary to crack them with powder. The Dupont Powder Co. took charge of this part of the work and assigned us George Willman, an expert powder man, to accompany the caravan. It was his duty to see that the stumps were properly split and to lecture on the proper methods of preparing stumps for blowing. This department of our work was of very great interest indeed to the farmers.

The success of our undertaking depended in a great measure upon the cooperation of our dealers. We called several meetings at the branch and throughout the territory and the whole programme was talked over with them, with the result that the 60 dealers in western Washington subscribed \$6000 towards the expense, the branch agreeing to underwrite the undertaking in that amount, at the same time agreeing to stand any additional expense which might occur. The implement distributors, the Oliver Plow Co. and the American Seeding Co. gave us all possible assistance, the distributors assigning us two of their men, the American Seeding Co. and the Oliver Plow Co. assigning us one man each. The Standard Oil Co. assigned L. T. Wagner, an authority on gas engines, and the lubricating engineer from its San Francisco headquarters.

Advertised as Land-Cleaning Demonstration.

While our main idea was, of course, to get over the power farming idea, we were of the opinion that if we were to advertise our caravan in connection with general farm work it would not have the attractive features which the stump pulling offered, for farm demonstrations had been given so often that they were of no



Second Avenue in Seattle, During the Fordson Parade—The Live Wire in the Leading Tractor Is Lieutenant-Governor William J. Coyle.
(Photographs by Courtesy of Standard Oil Co. of California.)

particular interest to the public in general, and so we advertised the caravan as a land-clearing demonstration, classifying it as strictly an educational undertaking. As an added feature in this connection we secured the services of the lieutenant-governor of the State of Washington, William J. Coyle. He accompanied the caravan throughout its tour as a speaker and, on account of his connection with the state and his general popularity, we assigned him the title of managing director of the caravan. The securing of Mr. Coyle proved to be a very splendid thing for the caravan, as he is a forceful speaker and is so thoroughly sold on the Fordson tractor and its unlimited possibilities that he could not help impressing those who heard him talk with his sincerity and the general utility of the product. Naturally the newspapers gave us a great deal of publicity. In fact, publicity was so general that we have had inquiries from all parts of the United States regarding our work. One inquiry came to us from Japan.

Question of Securing Men.

The question of securing men was also a vital problem, for we could not possibly spare enough from the branch to man the caravan throughout its trip. We accordingly placed the matter before the dealers, assuring them that it was an unequalled opportunity for them to train men for tractor work. Many of the dealers took advantage of this and we are free to say that their men received training and experience which will prove invaluable to them. We also took the matter up with the Federal Board of Vocational Training and secured seven men from that department. These men wished practical experience and this proved to be an unusual opportunity for them. For speakers and lecturers we drew from the implement manufacturers and other exhibitors. The State college also furnished us two speakers in Professor L. J.

Smith, in charge of the Department of Agricultural Engineering, and Professor Warfel of the Mining department. In addition they instructed their county agents to cooperate with us and it was due in a

to give a good snappy demonstration in the event of our dealers being unable to handle the situation.

Large posters were printed giving the dates and places of demonstrations, cir-



Demonstrating That You Can "Play Horse" with a Fordson and a Standard Oil Tank Wagon—As an "Attention-Getter" This Turnout Was One of the Pronounced Successes of the Caravan.

great measure to their untiring efforts that many of those who witnessed our demonstrations were interested.

Dealers in their respective communities were instructed to secure permission from the owner of a piece of stump land to go on to his land and blow and pull stumps. The stump land selected was preferably near a cleared field where the general farm work could be demonstrated along with the actual stump pulling. Needless to say we experienced no difficulty in getting permission wherever asked. The dealer or group of dealers were to take care of the farming demonstration to the extent of having their own equipment, their own tractors and implements on the field ready for the work. In this way it was not necessary for us to take our implements off the trailers except on occasions where certain unusual kinds of work were to be demonstrated. In as far as possible the dealers' own men were to do the farm work, but our men were always available

cular letters were sent out to all farmers in dealers' respective communities, and advertising was carried on in local papers. All expense connected with local demonstrations and advertising was borne by the dealer or group of dealers in the territory immediately surrounding the points of demonstration. The money which had been contributed to the general fund was to take care of general advertising and other expenses connected with the fitting out of the caravan.

Forty-Five Towns Visited.

In all we gave 16 demonstrations of stump pulling and power farming and in addition visited 45 towns. Talks and lectures were given in the towns visited and at demonstration points, with the result that we actually demonstrated before 29,000 people and spoke to 45,000 in towns where no demonstrations were held. In addition to this we estimated that there were between 200,000 and 300,000 people who saw our caravan and learned something of the tractor.

A complete motion picture outfit was carried with us and shows were given practically every evening of our trip. These shows were given sometimes in the local theater, but more often out in the open against the side of a barn or garage. At these shows we gave anywhere from three to five lectures. We found that the evening shows were very popular indeed and were of great interest to all who saw them.

In order to insure current for our picture machine we arranged with the Lalley Light and Delco Light agents to take care of this part of the work. The Delco Light representatives were especially alive to the opportunity and fixed up an unusually attractive trailer. In addition to furnishing light for our picture show, light was supplied for the trailers, which were wired also and well illuminated at night, so that farmers who were too busy during the day to visit the demonstration grounds could look over the equipment in the evening.

Trailer Equipment.

In addition to the 10 special trailers which we built, we had two tractors



Spectators Attending the Demonstrations at Redmond Became Auditors When Lieutenant-Governor Coyle Began a Talk on Tractor Use and the Motorized Farm.



A Feature of the Fort Lawton Demonstration (and Many Others) Was the Stump Pulling—The Fordson, Converted Into a Donkey Engine, Showed How Stumps Could Be Removed with Neatness and Dispatch.

equipped with mowing machines, one hauling a road grader, one drawing a hay baler, one tractor equipped with an attachment for handling lumber, one tractor drawing equipment wagon, one equipped with special truck attachment carrying a tractor with locomotive equipment. In all there were 22 tractors in the caravan, all of which were equipped with brakes, as were also the trailers. We devised a special muffler also for the trailers in order to meet with the traffic laws of the state.

Special trailers carried the following equipment: Cut-away tractor, which was of unusual interest, as we had it connected up with an electric motor which got its power from our lighting plant (this showed all the moving parts and was always a drawing card); disc, spring and spike-tooth harrows; ditcher; road grader; Fresno; plows, disc, side hill, orchard, sulky and No. 7; Ansco drill; wood saw, feed grinder; water system; culti-packer; lighting outfit; ensilage cutter and many other things in general use on the farm. In our equipment wagon we carried extra parts, bedding and tents for our men. Our original plan was to take a rolling kitchen with us also, but this did not prove to be practical.

A special speedometer was made for us by the Stewart & Warner people and at the conclusion of our trip it registered 883 miles; but in order that we might visit all of the territory in western Washington it was necessary for us to make three barge trips, one of which took us out on the Pacific ocean.

We believe the following statement from the Dupont Powder Co. will be of interest:

"A summary of the details regarding the cracking of stumps at the various points at which land clearing demonstrations were held furnishes the following data:

"For pulling purposes there were cracked a total of 212 stumps, totalling in diameter 7358 inches, averaging almost 35 inches to the stump. There was used for cracking these stumps a total of 1560 pounds of powder, or an average of 7 1/3 pounds of powder to the stump of this average size of 35 inches. This would indicate, therefore, that the use of powder in the ratio of 1/4 to 1/5 the number of pounds that the stumpage equals in diameter would be a satisfactory basis on which to figure the volume of stumping powder required for this cracking work.

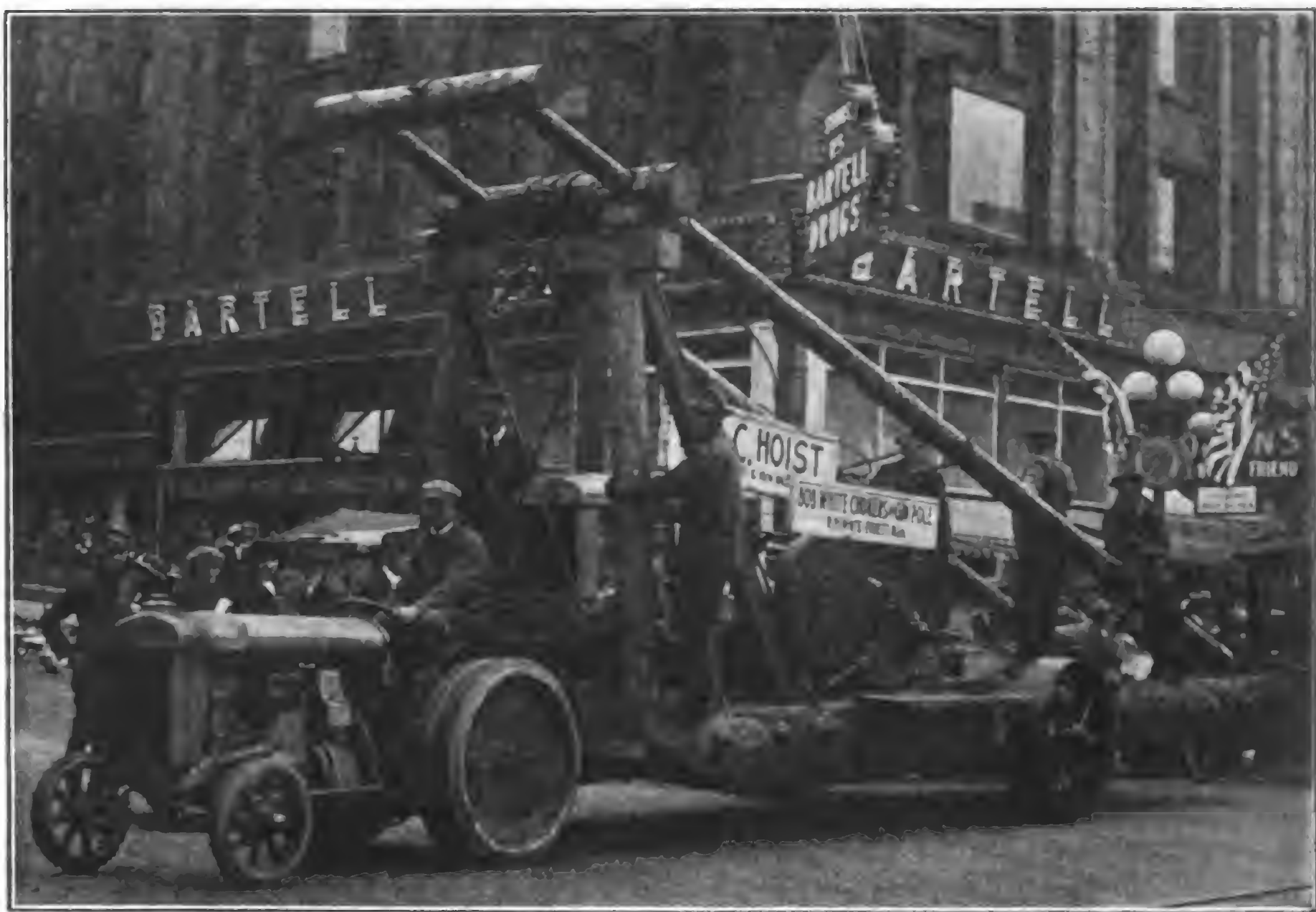
"There was also used in connection with the powder 167 blasting caps, 51 electric blasting caps and 600 feet of fuse,

and the cost at retail to the farmers buying this material would represent a charge of \$285, or approximately an average cost for powder, caps and fuse of \$1.35 per stump of an average diameter of 35 inches.

"Our experience in the clearing of cut-over lands in this district has demonstrated conclusively to us that the average acre of land to be cleared contains from 1000 diameter inches to not to exceed 1200 diameter inches per acre. In other words, 34 of these average stumps such as were blasted and cracked for the M. A. C. hoist to pull and pile would represent the stumps necessary to remove on a representative acre of land in this north-western section. You will see from this that this represents a cost of approximately \$45.90 for explosives and accessories per acre.

"There would be, of course, occasional acres having larger diameters to the average of their stumps, but usually in most cases we find that when this condition exists there are less stumps per acre and so we believe you are fully justified in using a maximum of 1200 diameter inches as a basis for the amount of stumps to be removed in various types of work in this district.

"We wish to call your attention to one other feature in this connection, and that is that with the dry condition of the ground at this season of the year it requires more powder satisfactorily to crack and split these stumps than it does during the wet season and at a time when the ground is much more soft. This in turn has undoubtedly added at least one-third to perhaps one-half greater quantity of powder than would have been required during the winter or rainy season. This hard condition of the ground at this time in a number of cases necessitated our shooting the stump more completely than would have been the case if the ground had been wet in order to enable the hoist really to pile the stump rather than to attempt to pull it out of perfectly hard-packed ground.



The Stump-Pulling Outfit as It Appeared in the Parade on the Streets of Seattle, Assembled and Ready to Begin Operations.



At Fort Lawton, Demonstrating That the Fordson Can Pull a Single Plow, as Well as a Gang, a Harrow or a Stump.

"We think there is no question but your demonstrations have conclusively shown that the use of nominal quantities of powder in splitting and cracking stumps in connection with a flexible and mobile apparatus of light weight and easy handling such as your tractor furnishes, in connection with M. A. C. hoist and automatic choker, represents the most modern, economical and satisfactory way to put these undeveloped lands into tillable condition most readily.

"We have, of course, the complete details in figures on each of these individual demonstrations, and if there are any further details that you require for completing your statistical reports on the results of your demonstrations we will be very glad to try to supply them if you will indicate what is required.

"Inasmuch as there are various types and strengths of stumping powder offered, it should be noted that the powder used in this work was du Pont 20 per cent. stumping powder. We regard this as the standard brand of this type of explosive."

In line with the above we found also that we consumed a gallon of kerosene per hour on the stump puller and oil to the value of about five cents per hour. The stump puller is built to be handled by two men. Figuring their time at \$6 per eight-hour day and averaging 24 working hours to the acre, we approximate the cost at about \$65 to \$70 per acre. This, of course, does not figure in the cost of the stump pulling outfit or the tractor. There are still some figures to be had on the cost of fuel consumption, but

on taking a general average we find that we used a gallon of kerosene per tractor for every 5½ miles travelled.

Quite a number of sales have resulted from our work and a great many prospects have been secured. The full force of our work, however, has not yet had its effect, for we find that it was of such magnitude that it left the public somewhat dazed and it will take a little time yet to comprehend the full significance of our message. The idea was put over in such a way that it really marks a new era, not alone in power farming, commercial work and land clearing, but in transportation as well. During our tour we covered the worst roads as well as the best roads in the state, and maintained an average speed of 8½ miles per hour. On the good roads, with rubber-tired wheels and hauling our trailers bearing weights from two to eight tons, we were enabled to maintain a speed of from 10 to 16 miles an hour.

Viewing it from the manufacturer's and distributor's standpoint, the real demonstration has been in the fact that the tractors stood up under the most trying conditions and were able to make the trip under their own power over the best and the worst roads in the state. No trouble whatever, outside of those of a minor nature, was experienced, and to quote one of our dealers who accompanied the caravan, "If the air washer is kept filled with water and the crank case kept filled with oil, the tools might as well be thrown away, for oil and water are the two things which if properly looked after will insure the tractor's perfect operation always."

It is my personal opinion that there is no limit to the possibilities of a tractor, for I have seen it perform under conditions which few have been privileged to witness, and I am not alone in this expression, for those who accompanied the caravan have thus far found it impossible to express their appreciation and respect for the Fordson.

(Continued from Page 549.)

cated, enables them to remain longer in their original adjustment than would be possible otherwise.

The interrupter housing may be rotated through an angle of 30 degrees as it is provided with an arm on either side by which a control connection may be made for advancing or retarding the spark.

The magneto may be cut out by a switch which short-circuits the primary current, one terminal being grounded by the engine and the other connected to a terminal on the interrupter cover.

Hot Spark Generated at All Speeds.

It is stated that the Apollo high-tension magneto will produce a spark across a 5/16-inch gap at a speed of 35 revolutions a minute. Proof of its ability to produce a hot spark at all speeds is borne out by a series of tests and measurements by impartial observers at the United States Bureau of Standards at Washington. From charts plotted at this test it was clearly shown that the Apollo magneto developed the hottest spark at all speeds as compared with several other well-known types, including representative French, German and American makes.

Testimonials received by the Apollo Magneto Corporation show that users are more than pleased with this magneto and in many instances are intending to equip their truck fleets wholly with this type. Among the features mentioned by users is the fact that the engine starts readily on the Apollo magneto.

CAUSES OF FAN TROUBLE.

When the fan does not run at the proper speed there are certain definite causes for the trouble. The belt may be greasy or it may simply have stretched so that it is too loose. The fan may be too tight on its bearing, which may be caused from lack of lubrication. The pulley may be loose on the shaft.

EXTRA LIGHTS.

An ingenious car owner recently equipped his bus with two extra lights, low down in the rear fender, completely illuminating the running board. He believes also that these lights make it safe to pass other cars at night and contribute to good running.

OHIO REGISTRAR EXPLAINS LICENSE TAG LAW.

State Automobile Registrar Snow, in a recently published statement, calls attention to the new law requiring that applications for next year's license tags must contain not only the name and address of the owner, but also the township, city or village in which he lives and also the year in which the machine was built.

This is the Hopley law, designed chiefly as a taxation measure. One of the application blanks is to be returned by the state to the county auditor, so he may ascertain whether machines are on the duplicate in accordance with the valuation scale fixed by law.

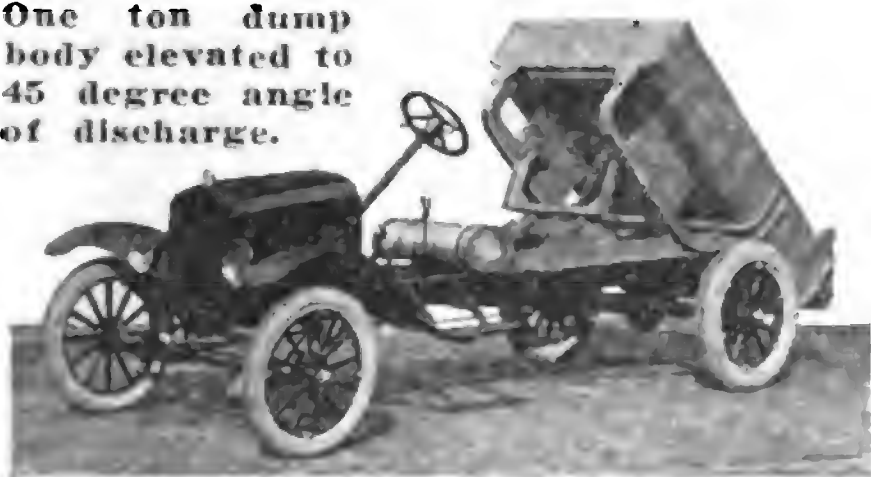
Double shifts will have to be put on at the penitentiary, Mr. Snow said, in order to complete the required number of plates by December, when 500,000 will be shipped to distribution points.

Secretary of State Smith has asked that 600,000 sets of passenger car tags and 100,000 truck plates be ready in December for distribution to the many registrars of motor vehicles.

Special Winsor Gravity Dump Bodies For Ford Trucks

Light, low cost, gravity dumping bodies of one, two, three and four yard capacity. Dumps load at a 45-degree angle by simply operating lever in the driver's cab. Adjustable rear gate for spreading material. Winsor Gravity Dump bodies are made of steel, hot riveted at all joints. Easily and quickly attached to Ford chassis. Steel sub-frame, mounting and dumping sills included with body.

One ton dump body elevated to 45 degree angle of discharge.



Write for Prices.

Transportation Equipment Company
7643 Gratiot Ave.,
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Locking device prevents accidental discharge.

The Accessory and Garage Journal

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to the Power Vehicle and Allied Industries and Trades. A guaranteed circulation of 25,000 copies to trade interests only.

Address all communications to the

TIMES BUILDING

Pawtucket

Rhode Island

LUBRICATING CHAINS ON YOUR MOTOR TRUCK

— SAVES MONEY —

time and labor—assures quietness, efficiency and comfort.

This is all we can say in this space, but for two cents we can give you a lot of information about

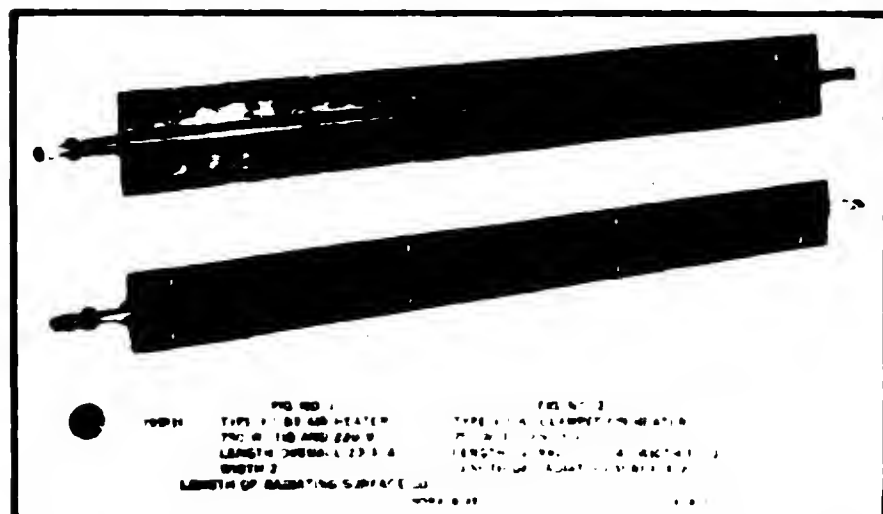
EAGLEINE CHAIN LUBRICANT

EAGLE OIL AND SUPPLY COMPANY

BOSTON **NEW YORK** **CHICAGO**
44-46 India Street Woolworth Bldg 1183 West 37th St

NEW SHEATH WIRE HEATING UNITS.

A new form of sheath wire for electric heating applications has been perfected by the General Electric Co., pioneer in the field of sheath wire development. The new unit is known as the Helical Coil Sheath Wire Unit, being a decided improvement over the drawn sheath wire unit which the company has manufactured for several years, as it is stronger and lends itself to a wider range of industrial heating appliances.



Air-Heating Type of General Electric Sheath Wire Unit, Equipped with Radiating Vanes.

The unit consists of a heating element in the form of a helical coil of calorte wire held firmly in place in a metal tube by a filler of powdered insulating material, giving a compact unit of great mechanical strength. The units have been standardized in diameters of .333, .4 and .496 of an inch, the lengths being up to six feet for the smallest diameter, and up to eight feet for the largest.

The sheath is made of different metals,

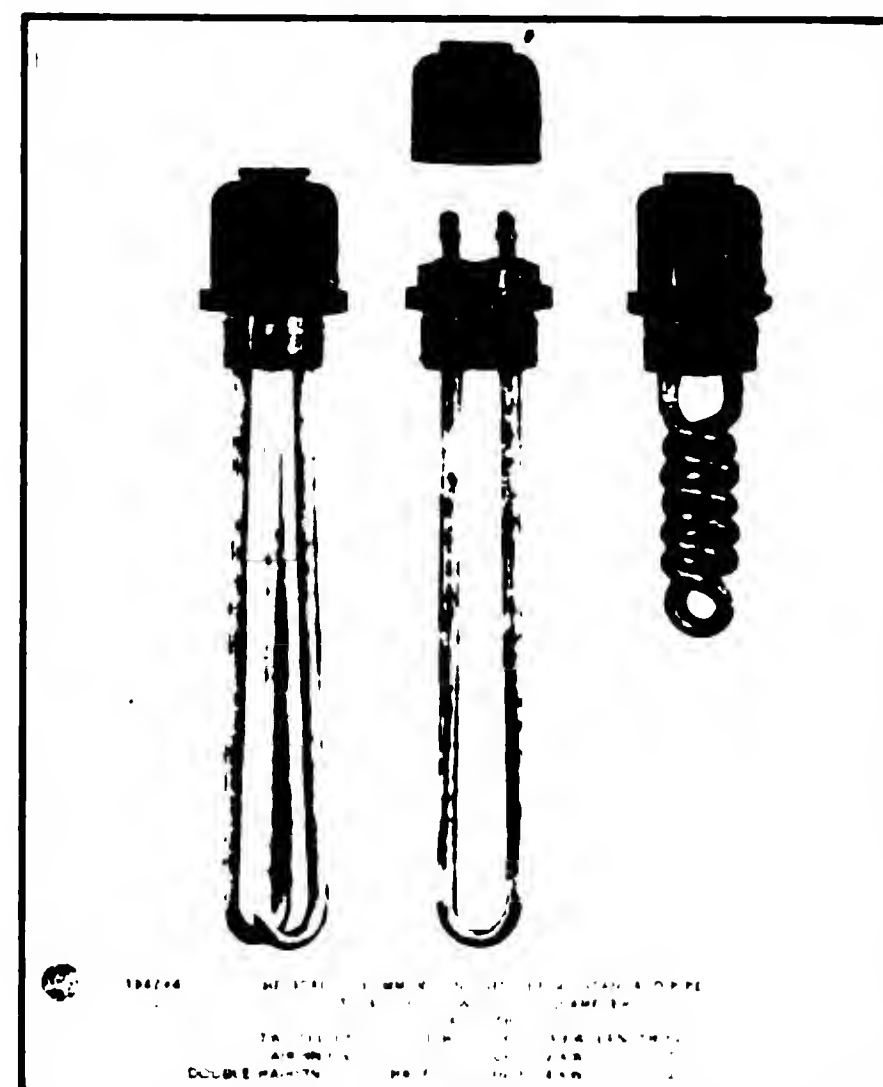
or alloys, depending upon the use to which the unit is to be put. For immersion in water the sheath is made of copper, tin dipped. For immersion in oil and when the unit is to be cast in a hot plate, a steel sheath is used. When the unit is to be run in the open air, or clamped on the sides of a melting pot, etc., a nickel silver sheath is employed except where the temperatures required are greater than nickel will stand, in which case a calorized steel sheath is provided.

Three special forms of heating units incorporating the helical core sheath wire have been developed. The first is known as an air-heating unit, and consists of a length of sheath wire, equipped with radiating vanes. The vanes are provided with screw holes, permitting mounting of the unit on porcelain knobs, the terminals for the power supply being at each end of the tube. This unit is easily employed for such purposes as heating small drying compartments, storage rooms, exposed valve houses, crane cages, etc., and on process machines where a small amount of heat is required.

The second variety is known as the clamp-on unit, in which the sheath wire is clamped in a steel channel by a strip welded to the latter, the flat surface of the channel serving as a heating surface. Screw holes for mounting are provided along either edge of the channel, and the terminal ends of the sheath wire are bent back to give clearance for the electrical connections. This heater is particularly adapted to warming tables, glue troughs, or other tanks with flat sides, flat plates on process machines, and

similar places where a small amount of heat is wanted.

The third type is the immersion heater, of which there are several forms. Those used for heating water have timed dipped copper sheaths, which are bent so that



Immersion Type of New Sheath Wire Heating Unit Perfected by General Electric Co.

the terminals come out through a common threaded head, provided with a japanned cap for protecting terminals. The oil-heating unit consists of two steel units with four terminals protected by a cap, and has a lower heat density than the others.

TRUCK MANUFACTURERS ENDORSE WOOD-DETROIT HYDRAULIC HOISTS AND STEEL DUMP BODIES

WOOD Hydraulic Hoists

Truck manufacturers realize that every part of the equipment either standard or special must stand up under most rigid conditions, severe tests and usage, hence the adoption as standard the Wood-Detroit Hydraulic Hoists and Steel Dump Bodies by most of the truck manufacturers of the country.

The Wood-Detroit Hydraulic Hoist is so widely used that it has been called the "universal hoist" and is noted for its rugged, sturdy construction, dependability and simplicity of installation and operation.

The following partial list of manufacturers that standardize on Wood-Detroit Hydraulic Hoists:

Acason	Garford	Lewis-Hall	Republic	Swedish-Crucible
American	GMC	Locomobile	Reynolds	Tiffin
Armleder	Gramm-Bernstein	Maccar	Rowe Motor	Triangle
Atterbury	Hamilton	Mapleleaf	Sanford	Traylor
Beasmer	Independent	Moreland	Schwartz	Truck Engineering
Brockway	International (Mack)	National	Selden	Union Motor
Corbitt	International Harvester	Noble	Service	Velle
Clydesdale	Jackson Motor	Nelson	Signal	Ward-LaFrance
Day-Elder	Kelly-Springfield	Packard	Standard	Watson
Defiance	Lange	Paige-Detroit	Sullivan	J. C. Wilson
Denby	LarrabeeDeyo	Pittsburgh Motor		

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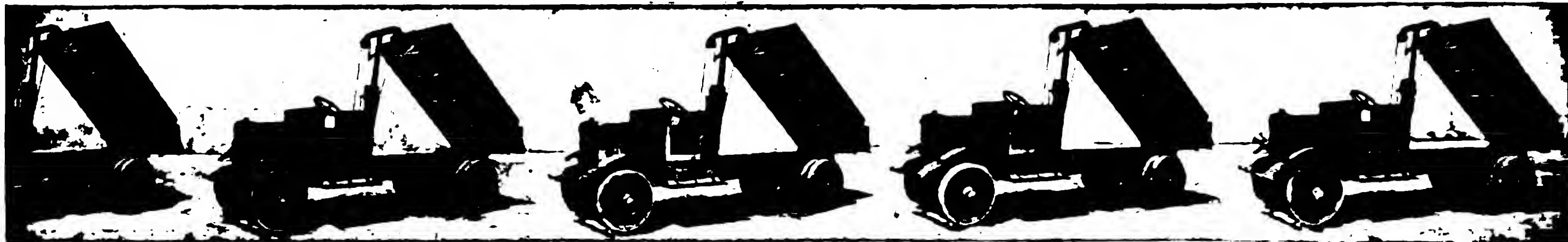
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Denver

Cleveland
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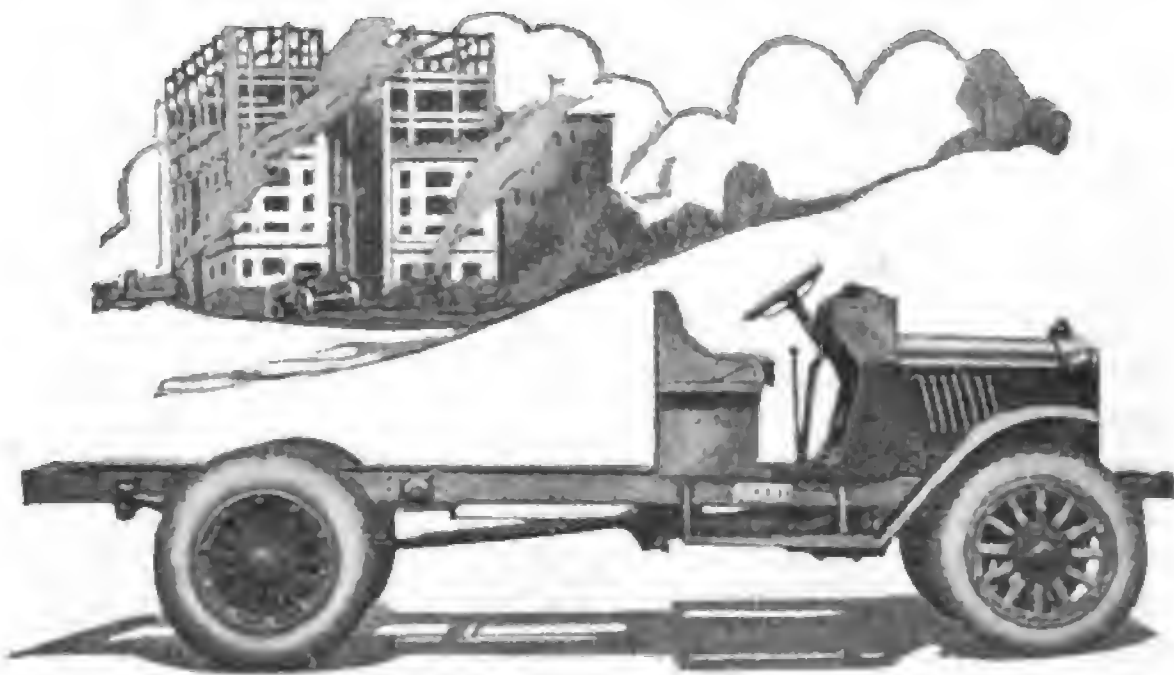
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DENBY MOTOR TRUCKS



MODEL 33-1 1/2 Ton

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Chassis with seat

A new model combining durability, economy, speed and appearance and suitable for many needs in motor truck transportation.

Denby Motor Truck Co.
Detroit, Michigan

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912. OF

MOTOR TRUCK,

PUBLISHED MONTHLY AT PAWTUCKET, R. I.

For October 1, 1921.

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the MOTOR TRUCK and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 448, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

PUBLISHER, WM. H. & D. O. BLACK.....Providence, R. I.
EDITOR, W. B. WATSON.....Pawtucket, R. I.
MANAGING EDITOR, S. G. SWIFT.....East Providence, R. I.
BUSINESS MANAGER, WM. H. BLACK.....Providence, R. I.

2. That the owners are:

WM. H. BLACK.....Providence, R. I.
D. O. BLACK.....Providence, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee.....Providence, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holder appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed)

WILLIAM H. BLACK, Co-Partner.

Sworn to and subscribed before me this 5th day of October, 1921.

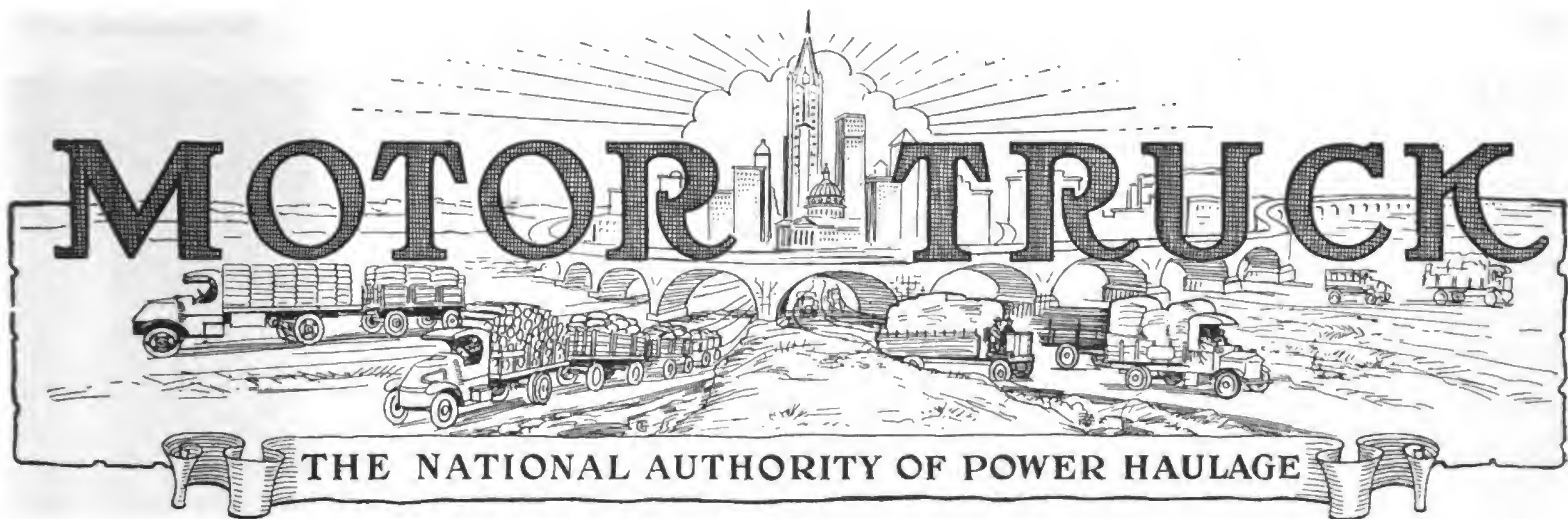
(Signed)

THOMAS BESWICK, Notary Public.

[Seal]

(My commission expires June 30, 1923.)

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)



VOL. XII. NO. 11.

PAWTUCKET, R. I.

NOVEMBER, 1921.

Use of Motor Trucks on Eastern Farms

SUMMARIZATION OF EXPERIENCE OF 730 OWNERS IN NEW ENGLAND AND MIDDLE ATLANTIC STATES—ADVANTAGES OF MOTORIZED SERVICE IN THIS TERRITORY POINTED OUT FOR BENEFIT OF BUYERS

IT IS universally conceded today that the motor truck is a valuable addition to the equipment on the majority of farms. Farmers often lack information, however, concerning the use of a truck for farm work and the cost of operating it, to enable them to decide whether one will be profitable or what size and type will be best. The experience of farmers who already own and use motor trucks is especially valuable to anyone who is considering the addition of these machines to his farm equipment. In order to provide information of this kind for farmers in the New England and Middle Atlantic states, a large number of eastern farmers who were known to own trucks were recently asked for reports concerning their machines. There are, however, many suggestions embodied in the returns, which will be found of value in other sections of the country as well. Each report gave the type and size of the truck, the use made of it, the cost of operation, its advantages and disadvantages for farm use, the owners' idea of its profitableness, and other related information.

THIS article, based on the experience of some 750 farmers in the eastern states, is not intended primarily to influence either for or against the use of the motor truck, but is designed to give other farmers operating under similar conditions information which will assist them in making an intelligent decision in regard to the purchase of a truck.

At the outset it may be stated that of the reports which were received all were excluded that had to do with second-hand trucks, vehicles made by the addition of truck units or attachments to passenger cars, and all that came from men who had owned their machines six months or less or who used them primarily for custom work or in connection with other

business and only incidentally for farm work.

The following is compiled from answers from 753 truck users of whom 241 are located in New York, 235 in Pennsylvania, 92 in New Jersey, 63 in Massachusetts, 40 in Maryland and lesser numbers in Maine, New Hampshire, Vermont, Rhode Island, Connecticut and



The Farmer, Shown at Left, with His Efficient Truck Equipment, Is in a Position to Seek Out the Best Market Without Loss of Time or Deterioration in Quality of Perishable Products—At Right Is Seen How the Truck-Ownning Agriculturalist Is Enabled to Harvest and Prepare Grain Crops for Market and Is Not at the Mercy of Weather Conditions.

Delaware. These men operate farms of all sizes and types, varying from purely truck farms of only a few acres to large general crop farms containing several hundred acres. One hundred and forty-nine are on truck farms, the average size of which is 64 acres, and their average distance from market is 12 miles.

Dairying is the principal enterprise on 129 farms of an average size of 234 acres, and the average distance from market six miles. Fruit farms of an average size of 111 acres each are operated by 113 and the average distance from market of this class is 11 miles. Forty-eight are operating general field crop farms, where few or no dairy cows are kept and no live stock is raised for sale. The average size of these is 237 acres and the average distance from market eight miles. On 314 farms no one special enterprise predominates. The average size of these is 210 acres and the average distance from market is 11 miles.

The motor trucks used range in size from one-half ton to five tons capacity. However, nearly half of the total number are one-tonners and only about two per cent. are rated at more than two tons. No attempt was made to ascertain to what extent the income had been increased through the use of trucks, but 95 per cent. of the reports stated that the machines bade fair to be profitable investments.

The matter of the advantages and disadvantages in the ownership of a motor truck was ascertained from answers to the questions, "What have you found to be the principal advantage of a truck for farm work?" and "What is the principal disadvantage?" The replies to the first question emphasize the following points: Over 90 per cent. believe that the saving of time is the principal advantage, the operation of a truck enabling the owner not only to put in more time at work on the farm, but also often to go to a better market or to get perishable products to market in better condition than would be possible with a horse team. About three per cent. believe that saving of the horses is the principal advantage. Only two per cent. believe that getting to a better mar-



By the Use of Trucks with Suitably Designed Bodies, Live Stock Can Be Quickly Transported with Convenience and Comfort and Reaches Market in Prime Condition.

ket is the chief advantage. However, nearly one-fourth of the total number are now selling to better markets than they did before they owned their trucks and in most cases these new markets are at a considerably greater distance from the farm than were the old.

About two per cent. consider that the greater convenience of the motor truck is its greatest advantage. Only one per cent. speak primarily in favor of the reduction of expense. The fact that such a small number consider the saving of horses, the reduction of expense and greater convenience as of paramount importance would seem to indicate that the amount of time motor trucks save, which incidentally may result in reaching a better market or in getting produce to market in better condition, is the item that should be given the most attention by the prospective purchaser.

The principal disadvantages emphasized are as follows: Poor roads is the reply given by 59 per cent. of those answering this second question. Seventeen per cent. consider the cost of operation as the principal deterrent and five per

cent. specify first cost as the chief disadvantage. The cost of operating trucks of different sizes varies from an average of eight cents a mile for the half-tonners to 20 cents a mile for two-tonners. The first cost varies from less than \$1000 to over \$3000. Inability to operate on soft ground is considered by about nine per cent. as the greatest disadvantage; a considerable number of those who hire drivers cite incompetency on their part as the greatest drawback, while about one man in 35 mentions trouble due to mechanical defects.

The Best Size.

The recommendations of experienced truck owners who answered the question, "What size do you now consider best for your conditions?" are particularly significant. Experience has caused 64 per cent. to prefer the same sizes they now own, 34 per cent. to favor larger sizes and two per cent. smaller. The proportion of those owning trucks combined with those preferring a different size indicates that in most cases the choice for a truck for farm work lies among the one, $1\frac{1}{4}$, $1\frac{1}{2}$ and two-ton sizes. Sixty-five per cent. now own one of these sizes and experience has convinced 80 per cent. that one or the other of these sizes is best.

The most striking point concerning these eastern farms on which trucks are already owned is their greatest distance from market than other farms in the same section. Only 18 per cent. of them are less than five miles from market, nearly 25 per cent. are 20 miles or more, and the average distance of all is about 10 per cent. Probably a majority of all the farms in the eastern part of the country are less than five miles from market, and a comparatively few of these nearby farmers have as yet invested in motor trucks. About one-fourth of the eastern farmers who own trucks have changed their markets since purchasing, and a large majority of them say that the new market is better than the old. These men who changed markets are, on an average, seven miles from the markets they used before they owned trucks and 20 miles from the markets which they now use. Before purchasing trucks, 75



This Would Seem to Offer a Solution of the Problem of Keeping the Boys on the Farm—With Motorized Equipment Life Becomes Full of Interest—In Fact, Almost a Round of Pleasure for the Farmer and His Entire Family and Help.



This Load of Potatoes Was Carried Direct from the Field to Market the Same Day They Were Harvested, and Rehandling and Storage Space at the Farm Were Saved.

per cent. of them were using markets which were less than 10 miles distant, but now over 80 per cent. go to markets which are 10 miles or more from their farms. About one-fifth market at centers which are 30 miles or more away.

Time Saved with Trucks.

The returns show that on the average it requires only 35 to 40 per cent. as much time to make a haul of a given length with a truck as it does with horses and wagons. This is for round trips and includes the time required for loading and unloading. When hauling crops the average load for the half-ton truck is about 950 pounds, whereas the average formerly hauled with horses and wagons was 1500 pounds. The average load of crops for the $\frac{3}{4}$ -ton trucks is 1850 pounds, 15 to 20 per cent. less than was formerly hauled with wagons by the same men. The owners of one-ton and $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton trucks haul on the average about the same size loads as formerly with horses and wagons. The average load of crops for the two-ton trucks is 4950 pounds, about 10 per cent. greater than the load formerly hauled with wagons. The trucks which are larger than the two-ton size haul loads 30 per cent. larger than their owners formerly hauled with wagons.

The average loads of all materials, except milk, are approximately the same as the loads of crops for trucks of different sizes and for wagons. Milk on these farms is hauled almost entirely with either one-ton or smaller trucks. Only 10 of the trucks on the 129 dairy farms are more than one ton in size. The average load of milk for the half-ton trucks is 600 pounds, and for the $\frac{3}{4}$ -ton and one-ton trucks, 1300 pounds, and all these men formerly hauled approximately the same size loads with their wagons as they now do with their trucks.

Return Loads.

The reports show that loads both ways are carried on an average of about 26 per cent. of the trips. About 30 per cent. state that they never have return loads. Dairy and general farmers report return loads a considerably larger percentage of the time than do the fruit, truck and crop farmers.

Nearly two-thirds of those owning trucks still use horses to supplement their trucks in hauling on the road, and

45 per cent. of these give poor roads as the reason. A majority of the remainder state that they use their horses either because the truck is too light for the load it was desired to carry or the body of the truck is unsuited for carrying the material. However, no farmer with a truck larger than the one-ton size states that he uses horses because the truck is too light. About seven per cent. of the total number say that they used horses to help out when the truck is busy and about an equal number state that, since they must keep their horses anyway they use them for some road hauling when they are not busy on other work.

Effect of Roads.

Poor roads are reported by most of the men who own trucks to be the principal disadvantage connected with their use, and poor roads is the reason why most of them still use horses for a part of their road hauling. On the average there were eight weeks in the year covered by the reports when the roads were in such condition on account of mud, snow, etc., that the trucks could not be operated. Twenty-nine per cent. of these trucks usually travel on dirt roads only, 46 per cent. on roads that are part dirt and part surfaced,

and 25 per cent. on roads that are wholly improved.

In all, less than 25 per cent. of the men found it possible to use their trucks every week in the year, and between 35 and 40 per cent. report that there were more than eight weeks during the year when they could not use their trucks. About one-half of the men with wholly improved roads state that they could use their trucks any time during the year, but only nine per cent. of those with all dirt roads were able to do so, and there were more than eight weeks during the year when 55 per cent. of these men with all dirt roads were unable to use their trucks.

A majority of these truck owners still haul in the fields and around the buildings exclusively with horses. The reason for not using the truck for this hauling is not given in every case, but many state that they do not consider their trucks suitable for such work. The men who report that they use their trucks for some hauling on the farm state that the most of such hauling is crops and fertilizer. The average length of haul reported was about 150 rods. The saving of time is given by 64 per cent. of these men as the reason for using their trucks in preference to horses. Eighteen per cent. report that they use their trucks for some hauling on the farm because a truck is more convenient than horses and wagons. When frequent stops must be made, or when the vehicle must be left without attention for a considerable length of time, it may be preferable to use the truck even though the horses remain idle and no time is saved by use of the truck. Eleven per cent. used their trucks because all the horses were busy at the time.

The men who do use their trucks for hauling on the farm report hauling only an average of 45 tons of crops and 37 tons of fertilizer per year with them, while the average amount of crops hauled to market per year with trucks for all the farms is 119 tons, and the average amount of fertilizer hauled on the road with trucks is 55 tons per year.

(Continued on Page 614.)



This Picture Illustrates How Hay May Be Handled with an Ordinary Commercial Truck Body—This Sort of Haulage Can, However, Be Done to Better Advantage and with Minimum Danger from Fire, with Especially Designed Type of Equipment.

Unique Motorized
Outfit Used by
California
Bee Man to
Triple His
Profits Through



Keeping His
Workers Contin-
ually on the Job
by Transporting
Them to
Fresh Fields.

Bee Industry Aided by Motor Truck

(By ALBERT MARPLE.)

A RESIDENT of southern California claims that, until the motor truck was introduced into the life of the bee, that "individual" did not know what it really was to work. This may seem a strong statement in view of the fact that the ordinary bee is claimed to be about the busiest thing in this old world, but the following story will prove its veracity, at the same time only going to demonstrate the usefulness and practicability of the power-driven truck in an entirely new field of endeavor.

It is generally acknowledged by the bee keeper, and especially by the man who is located in southern California, where practically all the year round is "summer time," that bees cannot do their best work if they are permitted to remain in one place throughout the year.

THEY generally feed for a radius of two or three miles around their hives and let it go at that. For this reason they either do a lot of unnecessary work in going over flowers that have already been "drained," or they cultivate the habit of lying around idle a great deal of the time, which is anything but desirable.

For this reason this bee keeper of southern California has devised the idea of moving his colonies of bees from place to place by motor truck, so that they may get the benefit of the different blossoming seasons in the various districts. It is interesting to contrast the old method of moving the bees with the most up-to-date process—the motor truck way—which has been devised and adopted by L. E. Mercer of Castaic, Cal.

Mr. Mercer's first move, after securing the 1½-ton Republic truck chassis, was to construct a house or body upon it, this having windows of screen. This body has a carrying capacity of 100 hives at a time. In the early spring each year Mr. Mercer conveys his hives by motor truck from the home ranch in Castaic canyon to the foot hills just above Glendora, something like 64 miles away, where there are hundreds of acres of orange groves, the blossoms of which trees make splendid pasture for the bees. From these orange blossoms this spring the bees of the 270 hives owned by Mr. Mercer gathered between five and six tons of honey.

By the aid of the motor truck the moving of these bees is carried on with remarkable speed and without the loss of a

single bee. The method of transportation is interesting. After the bees have done their day's work and have retired for the night, the owner carefully closes the entrances to the hives and places them gently within the truck, each load consisting of about 100 hives. The transporting operation is done at night so that, while the bees go to bed at Castaic, they wake up the following morning in Glendora, 64 miles away. As it is a smooth road all the way the bees and hives and combs are in no way damaged. In three nights the entire apiary is moved from the one place to the other. When the honey season at Glendora is ended the bees are transported to the Ventura section, where they are permitted to remain throughout the summer season, when the thousands of acres of bean blossoms are available. After the bean blossom season is closed the bees are returned to their home ranch in Castaic canyon, where they gather honey during the winter from the blossoms of the sage brush on the mountainside.

Truck Also Used for Extractor House.

Not only is this motor truck used as a means of transportation of the hives from place to place, but it serves as a work house, or extractor house, as it is known. The room is supplied with a power honey extractor, driven by a gasoline engine. By having the truck equipped in this manner it is not necessary to move the hives heavy with honey but, before each moving process, the honey is extracted and shipped from the nearest station. The extractor house may be backed right up to the hives so that it is always ready

and convenient. Its several open sides are screened so as to exclude the bees while the workman is busy in the extracting process.

By moving the bees from one section to another the bee man secures almost three times the honey each year that he would receive were they permitted to remain in one place. This, however, is not the only advantage derived from this moving stunt. It has been definitely learned that after a winter in the hills the colonies grow stronger with the early pasture that the orange blossoms afford, so that instead of becoming run down in health on account of the additional work, the bees, because of having a richer pasture, are always kept in full strength. Although of better quality the sage brush honey is considerably harder to gather, and it has been found that the bees do much better work in the sage brush after they have had a season in the orange or bean blossoms, than they did when they were kept constantly in the canyon.

"Before the motor truck made it possible for us to transport our bees from place to place as we are now doing," said Mr. Mercer recently, "we secured about eight tons of honey each year from our bees. Now we get about this amount of the sage brush honey, and in addition we get between five and six tons of orange blossom honey, and between nine and 10 tons of bean blossom honey, which shows that the truck has enabled us to almost treble our honey crop. As honey brought 12 cents a pound last year it will be seen that it was surely a wise move to purchase the truck."

Radiophone Adapted to Trucks

Unique Sending Set Allows Truck Drivers to Receive Messages from Home Office—Equipment Inexpensive and Operates as Easily as House Telephone.

IT IS probable that nearly every truck driver has read in the newspapers and magazines devoted to new mechanical and electrical ideas, descriptions of vehicles controlled by a new element called Radio, which is able, at the will of the operator and at a distance from the object so controlled, to make the vehicle perform in a manner similar to that when an operator is aboard and operating the vehicle himself. Small automobiles have been used in an experimental way for this purpose and in some instances larger models which very nearly approach the conventional sized motor truck. Such vehicles are equipped with the necessary instruments for controlling the vehicle and closely resemble those used by the operator.

The United States government has accomplished much in this line and uses the principles of radio control to manoeuvre obsolete war ships employed for targets in big gun practise.

THE operator and the set of instruments controlling the movements of the vessel are usually located on a second vessel, which is kept at a safe distance from the target and all movements of the target, which may include turning in a circle, going ahead, backing up, changing speed, from slow to fast, etc., are entirely at the mastery of the operator.

Wireless or radio telegraphy has been in use for some years, and practically every high-school boy is more or less familiar with its working principles. As soon as the boy gets interested in the subject he rigs up a wireless set at his home with antennae on the roof of the house and suitable instruments in his room, usually home-made, but often purchased, and receives great enjoyment from listening in to the talk of other school boys in his immediate vicinity or, if his instruments are powerful enough, he may be able to attune them to the right pitch and hear conversations of the major government stations.

Each state has an ever-increasing number of amateur wireless operators and the call for instruments to fill this demand tends to show the interest taken in this subject by young America. The conversation is carried on entirely by the Morse code of dots and dashes and for this reason is more adaptable to stationary outfits than for portable use. Although some operators who are particularly skilled, have made portable sets which can be transported in a suit case, such outfits are more of a novelty as their working radius is short.

Many amateurs have shown great ingenuity in making their instruments, and this has naturally caused improvement and advancement in the older forms, forcing manufacturers of this type of apparatus to devise and offer for sale instruments and apparatus that are up to date.

Radio operators in all parts of the country are becoming more or less interested in the newer form of wireless and are studying and experimenting with the latest, the radiophone, a form of intercommunication without connecting wires. That it will not conflict with the usual form of telephone service using wires

either now or in the future, is a foregone conclusion because it occupies a field entirely separate from the older form using connecting wires, and large telephone companies are already established to handle the business of cities and towns, which the radiophone cannot handle. Again the radiophone loses its acoustic powers in large cities on account of the number of steel frame buildings that absorb its current, weakening the tone and preventing it from functioning at its best.

During the war great strides were made in both radio telegraphy and radio telephones, especially in the latter, as they were used largely between isolated points of observation for sending and receiving orders from headquarters. Messages were sent in code form that were not readily translated by the enemy and the usefulness of this form of telephoning was amply demonstrated.

In its improved form and simplified apparatus radiophone messages may now be sent practically any distance without the use of wires, depending simply upon the sending voltage and the ability of the receiving instruments to receive and make the message clear.

Principle of Operation.

Throw a stone into a pond of water and waves radiate out from the point where the stone entered, spreading in all directions till they eventually reach the shore or are lost in the larger body of water. Cause a spark to jump a gap in the atmosphere and waves of like nature are set up which travel in like manner from the point of contact. The ether of the atmosphere is the medium which transmits wave movements, caused by the electric spark to travel with the velocity of light to distant points, the distance travelled depending upon the amount of initial motion or the intensity of the spark. For this reason sparks of high frequency, voltage or pressure are required in wireless telegraphy or wireless telephony. The intensity of the spark determines the wave length, while the calling or called station depends upon a certain tone to the wave for sending and answering and is termed tuning; that is, one station will have a certain tone which it uses in sending and receiving messages, while another station to receive the messages must meet that tone exactly to receive the message.



Ford Coupe Owned by Mr. Gliblin, Pawtucket, R. I., Equipped with the Radiophone Receiving Set Capable of Receiving Messages a Distance of 150 Miles from Sending Station—The Antennae Are Strung Only a Few Inches Above the Coupe Top.



Mr. Giblin Demonstrating the Radiophone to the Writer—This Illustration Gives a Good Idea of the Manner in Which the Antennae Are Attached.

Heretofore it has been necessary to have large generating sets and high towers to carry the antennae for transmitting the messages over long distances. These are still necessary in the large major stations owned by the United States and foreign governments, but for the smaller installations of amateurs the masts carrying the antennae are not as high, but the results are sufficient for experimental purposes. Powerful coils composed of many turns of copper wire are used to raise the voltage given by the generator to a sufficient height for transmitting the message, and coils of equal power are used at the receiving end.

Wireless telephony, on the other hand, does not demand such expensive equipment, as the wave lengths are shorter and high masts are not required. In fact good results have been obtained by burying the antennae wires in the ground, having several of them run in different directions so that it is possible to pick up a message from any point of the compass. A switch, connected to each wire by contacts and a revolving arm makes contact with the connectors, providing means of selecting the wire which points in the right direction.

Developed Duo-Lateral Inductance Coil.

A young man who is very much interested in this subject and who has done much to further the cause is Thomas P. Giblin of Pawtucket, R. I., who is responsible for the development of the Duo-Lateral inductance coil.

Radiophone Adapted to Motor Vehicle Service.

The honeycomb wound coil, contrary to popular belief, is not a new invention, as approximately 15 years ago it was conceived and samples were actually made.

The unique machine which winds this type of efficient inductance is manufactured by the Universal Winding Co., an eastern concern, which is primarily the maker of textile winding machines, which include apparatus to accomplish the winding of everything from fine silk thread to heavy rope, as well as wire. Who would believe that this famous inductance coil was in any way connected

with the ordinary cotton yarn winding machine? Shortly after the war started the "bank" form of winding made its entry into commercial radio apparatus. The winding was literally snapped up on account of its small distributed capacity within a minimum space area. Its great fault, however, was that the inductance made after this fashion had to be wound by hand, which proved very costly.

The sudden demand for radio receiving apparatus forced manufacturers to seek some method of winding the coils by machinery. This problem was submitted to the Universal Winding Co. and was neatly solved by the use of one of their winding machines. Mr. Giblin, an electrical engineer, a real and enthusiastic radio amateur, being connected with the company, took up the matter of this proposed bank winding machine and after careful study and experimentation with the assistance of mechanical experts, decided that such a machine could not be developed in the limited time allowed by the

government; the primary consideration being to manufacture great numbers of receiving instruments as soon as possible for use during the war emergency.

After the armistice was signed, late in 1918, one of the large radio manufacturers became desirous of bringing out new apparatus. Experts were sent East and the subject of the basket wound coil was again taken up. Mr. Giblin was not to be again side-tracked in his belief that this type of coil and method of winding would prove effective for radio work, and continued his experiments so that in February, 1919, he developed the first practical honeycomb coil.

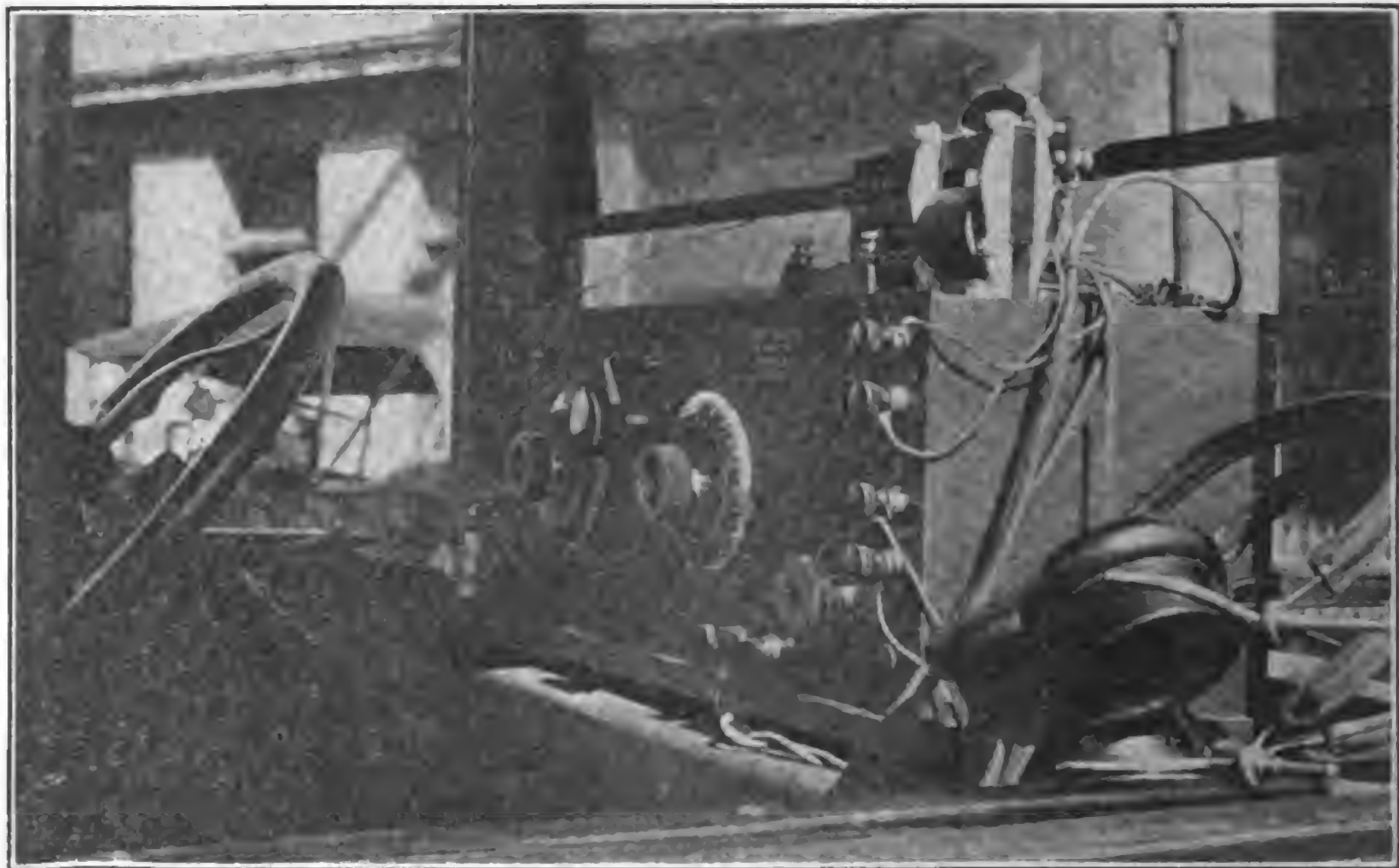
After a number of exhaustive tests at the Bureau of Standards and leading radio colleges, as well as by large radio manufacturers, several designs were perfected, making this type of winding most suitable and effective for short and long wave reception. Several months after the fame of the honeycomb coil had travelled far and wide and as an example of its highly successful commercial value, it has been estimated that from July, 1919, to April 1920, approximately 80,000 coils were distributed throughout the world. At present over 12,000 coils are being sold each month.

Duo-Lateral Inductance Coil a Decided Improvement.

Not being fully satisfied with the characteristics of the honeycomb coil, the inventor later brought out a new type of inductance called the Duo-Lateral, which is stated to by far exceed other coils in efficiency. Although this later coil much resembles the former, it has decided electrical advantages, and these are made possible through its peculiar mechanical construction.

Laboratory experiments at reputable colleges and also by reputable manufacturers, have proved that this coil, in comparison with other similar types, has 15 per cent. less distributed capacity, 12 per cent. more inductance, as well as $7\frac{1}{2}$ per cent. less high-frequency resistance and natural period. Not only this, but it is

(Continued on Page 613.)



Receiving Set Occupies but Little Space in Coupe at Right of Driver—The Sensitive Receivers Are at Extreme Right, While Knurled Buttons on Front of Set Enable Operator to Tune It to Correspond with Transmitting Set—Wire at Left Connects Antennae on Roof of Ford Car with Set.

Midwest Engines Severely Tested

New Stock Model 408, Designed for Light Speed Trucks,
Embodies Principles Which Have Made Previous Engines
Popular in Automotive Industry.

MIDWEST high-speed heavy-duty truck and tractor engines, manufactured by the Midwest Engine Co., Indianapolis, Ind., offer truck and tractor manufacturers a solution of their power problems, as they are stated to embody the desirable qualities of high torque, or pulling ability, combined with great power at low speeds and economy in operation. A new truck engine has recently been placed on the market by this company known as stock model 408. This is a four-cylinder unit having a bore of $3\frac{5}{8}$ inches and stroke of five inches. Of similar construction to the other two engines in the line, models 402 and 400, this engine follows Midwest lines throughout. It is designed especially to fill the requirements of manufacturers building high-speed, pneumatic-tired trucks.

THIS engine delivers its greatest torque at 1000 revolutions a minute, delivering 130 pounds to the foot at 25 horsepower, which indicates a fairly slow speed engine of great pulling power.

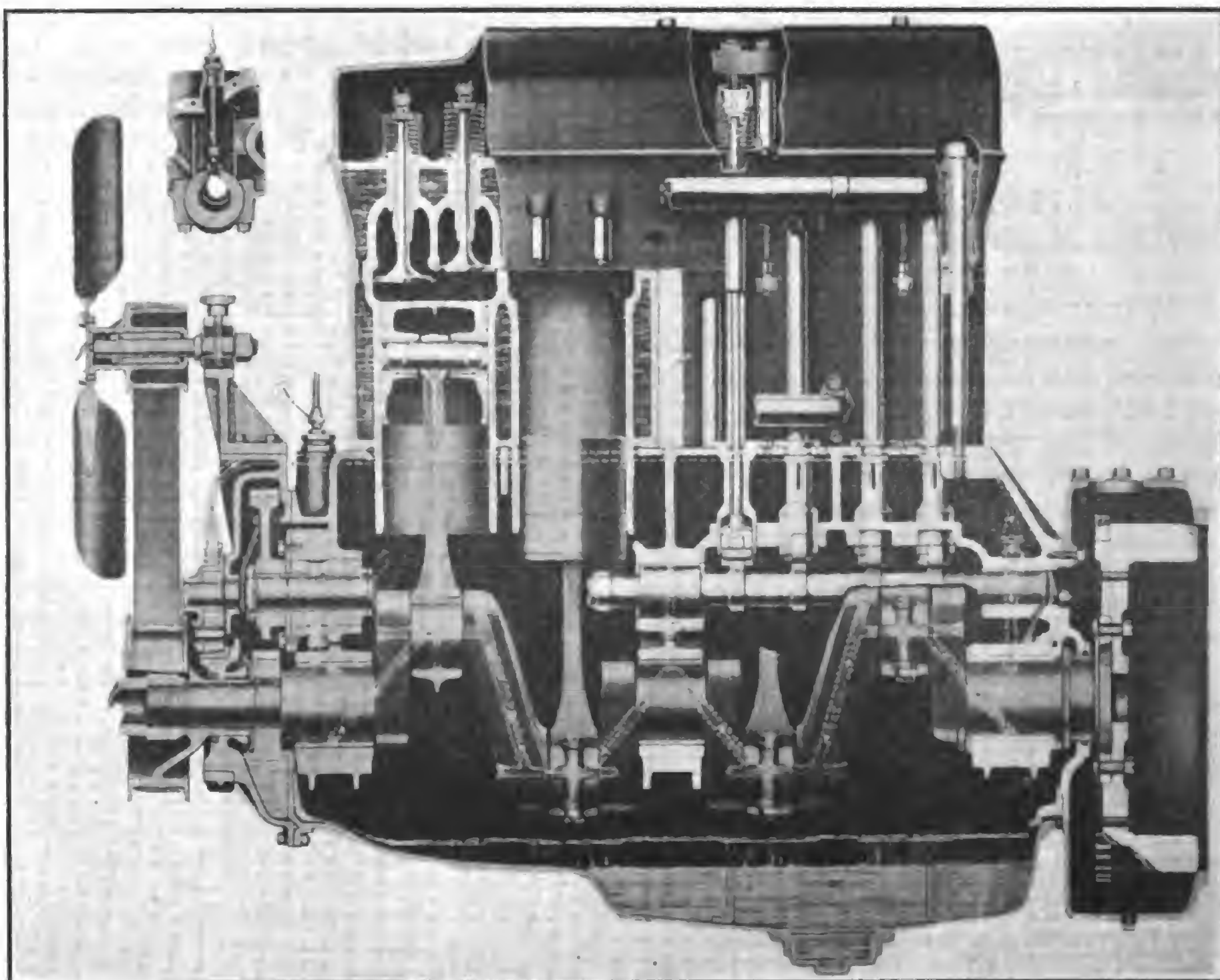
The crank shaft is unusually large for an engine delivering this amount of power, being $2\frac{1}{2}$ inches in diameter, sufficient to prevent whipping on the main bearings. With this oversize shaft, it is claimed that all bearing pressures are equally distributed and assurance given that bearings will remain in perfect alignment. The continuous flow of oil through the center of the crank shaft maintains a constant temperature on both the main and connecting rod bearings, insuring cool bearings under working conditions.

The Midwest engine, Model 408, solves satisfactorily the problems presented by wide ranges of speed and load in high-speed trucks. The lubrication is so controlled that the oil is fed to the bearings with relation to the load and not to the speed of the engine. The system provides engine lubrication: First at idling or medium speeds under light loads without excess oiling; second, at low, medium and high speeds without under-oiling; third, with the crank shaft and crank pin bearing temperatures kept below the point where the oil loses its lubricating properties.

The oil in this system is delivered to all crank shaft, connecting rod and cam shaft bearings under pressure by a self-primed, gear type pump. Delivering the oil under pressure with respect to load absolutely eliminates under-lubrication or over-oiling as conditions of speed and load change.

The lubrication is absolutely controlled by a by-pass valve connected to the gasoline intake manifold by a copper tube. The crank shaft is drilled from end to end. The lubricating oil, entering the main bearings under pressure from the oil pump, passes completely through the shaft, lubricating the main and connecting rod bearings, also the cam shaft bearings, and escapes through the by-pass valve at the front main bearing into the timing gear set.

When the engine is idling or is under a light load the throttle is partially closed, and the vacuum (or suction) developed



Sectional View Midwest Engine Indicating Type of Construction and Relation of Units—A Drilled Crankshaft Supplies the Main and Connecting Rod Bearings with Lubricant as Well as the Cam Shaft Bearings—The Valve Mechanism Is Lubricated Through the Tubes Surrounding the Push Rods.

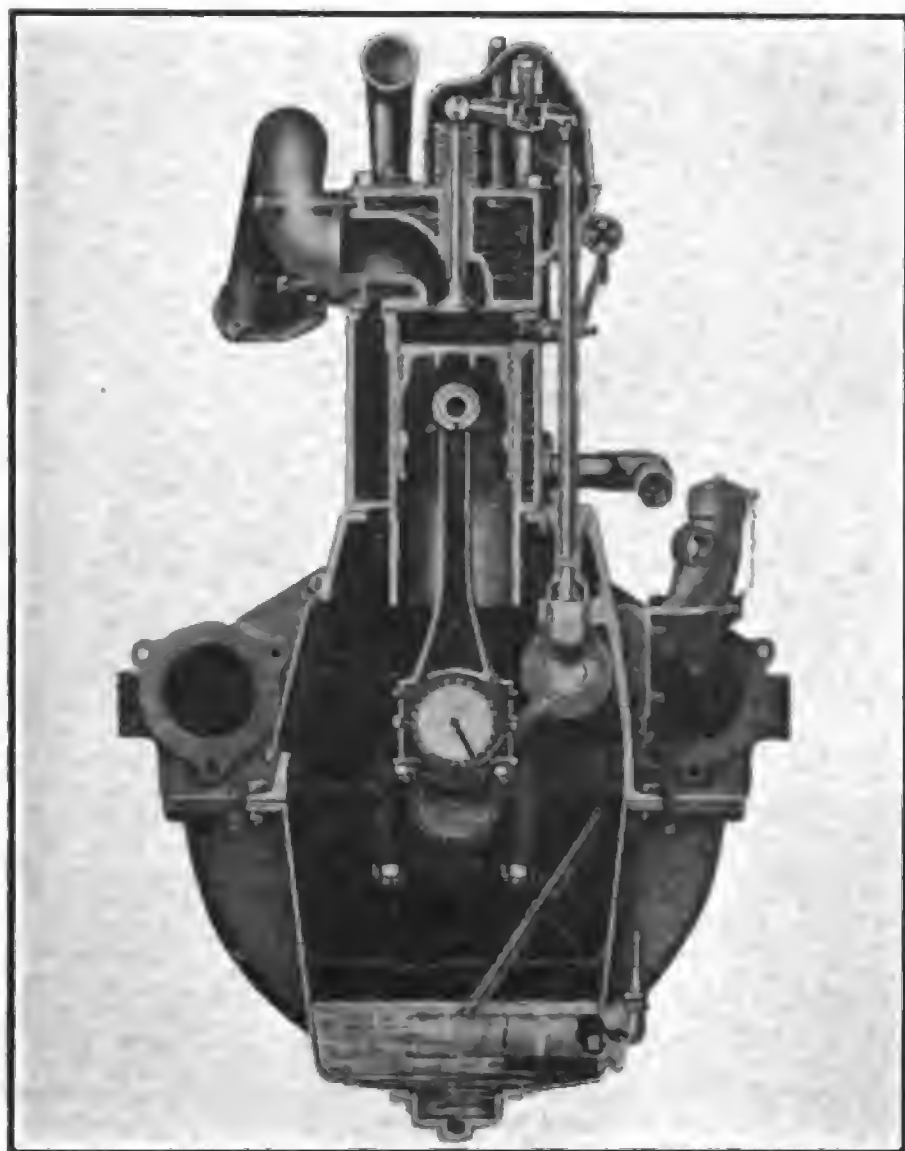
in the cylinders lifts the piston in the oil control valve and allows the oil to pass out freely from the front end of the crank shaft into the timing gear set. As additional load is placed on the engine the throttle valve is opened further to admit more fuel. This action causes more "pull" by vacuum on the incoming fuel and less lifting action on the oil control piston. As this piston nears its seat the outflow of oil from the front end of the crank shaft is held back. At the same time the oil pump pressure on the oil entering the rear end of the crank shaft is increased as the engine speeds up to take care of the increased load, and the oil in the crank shaft, caught between the two pressures, is forced into the main and connecting rod bearings in sufficient volume to lubricate these bearings properly for the increased load on the engine. This action floats all the bearings on a film of

oil at all times. It is claimed that there is never a metal-to-metal contact in Midwest engines.

The position of the oil leads in the crank shaft forces the oil into the bottom side of all the connecting rod bearings ahead of the bearing pressures. No oil grooves or shims are used. There being no direct lead for the oil to pass out of the connecting rod bearings, it must spiral to the outer edge in an unbroken film. This permits the use of loose bearings throughout, reducing internal friction to a minimum.

Dust Proof Qualities.

The Midwest engine is not equipped with the type of breather which allows the direct entrance of dust into the lubricating oil. Eight steel tubes enclosing push rods equalize the pressure in the engine crank case and valve cover, delivering a continuous spray of oil to the overhead



Sectional (End) View of Midwest Engine Showing Location of Oil Reservoir and Oil Filter.

valve mechanism. The patented Midwest breather, positioned on the valve cover, releases the air necessary to relieve the crank case vacuum.

The rocker arms used in Midwest engines are the full rocker type, having non-slippage action at the point of the fulcrum. The wearing surfaces in contact are of large area, that on the rocker arm being convex and, on the adjusting screw fulcrum, flat in shape, giving a rolling contact between these two surfaces. The rocker arm is held centered on the adjusting screw at all times, regardless of wear occurring at this point. The adjusting screws are in the rocker arm stanchion bar and can be adjusted while the engine is operating.

Ample Cooling Facilities.

Unusually large water passages are provided in this engine and positive circulation is insured by the use of a propulsion type water pump, gear-driven. The cold water from the radiator is forced directly around the exhaust valve seats, thus cooling the engine "hot spot" first. The warm water then passes down around the cylinder walls, eliminating "cold spots," and from this point rises and returns to the

radiator through the water outlet manifold.

Determine Engine Value by Tests.

During the past few years many of the most prominent engineers in the country have given Midwest engines thorough and gruelling tests with the result that a large number of representative tractor and truck manufacturers have adopted and

its customers. These are the results of tests conducted by T. Eaton Co., Toronto, Can. The same route was covered in each case under the same average conditions, thus giving each truck a fair trial to show its capabilities.

The tests were carried out in a Harmer-Knowles High-Economy motor truck of 1½-ton capacity, using 38 by seven-

Capacity of Truck		Travelled Miles	Gallons Gasoline	Gallons Oil	Miles Per Gallon Gasoline	Miles Per Gallon Oil
1½-Ton	No. 1	228	53	5½	4.301	41.45
1½-Ton	No. 2	549	86	3½	6.38	175.3
1½-Ton	No. 3	1107	183	7¾	6.04	142.8
¾-Ton	No. 4	858	118	3½	7.27	274.55
1½-Ton	Midwest	495	57	½	8.68	990.0

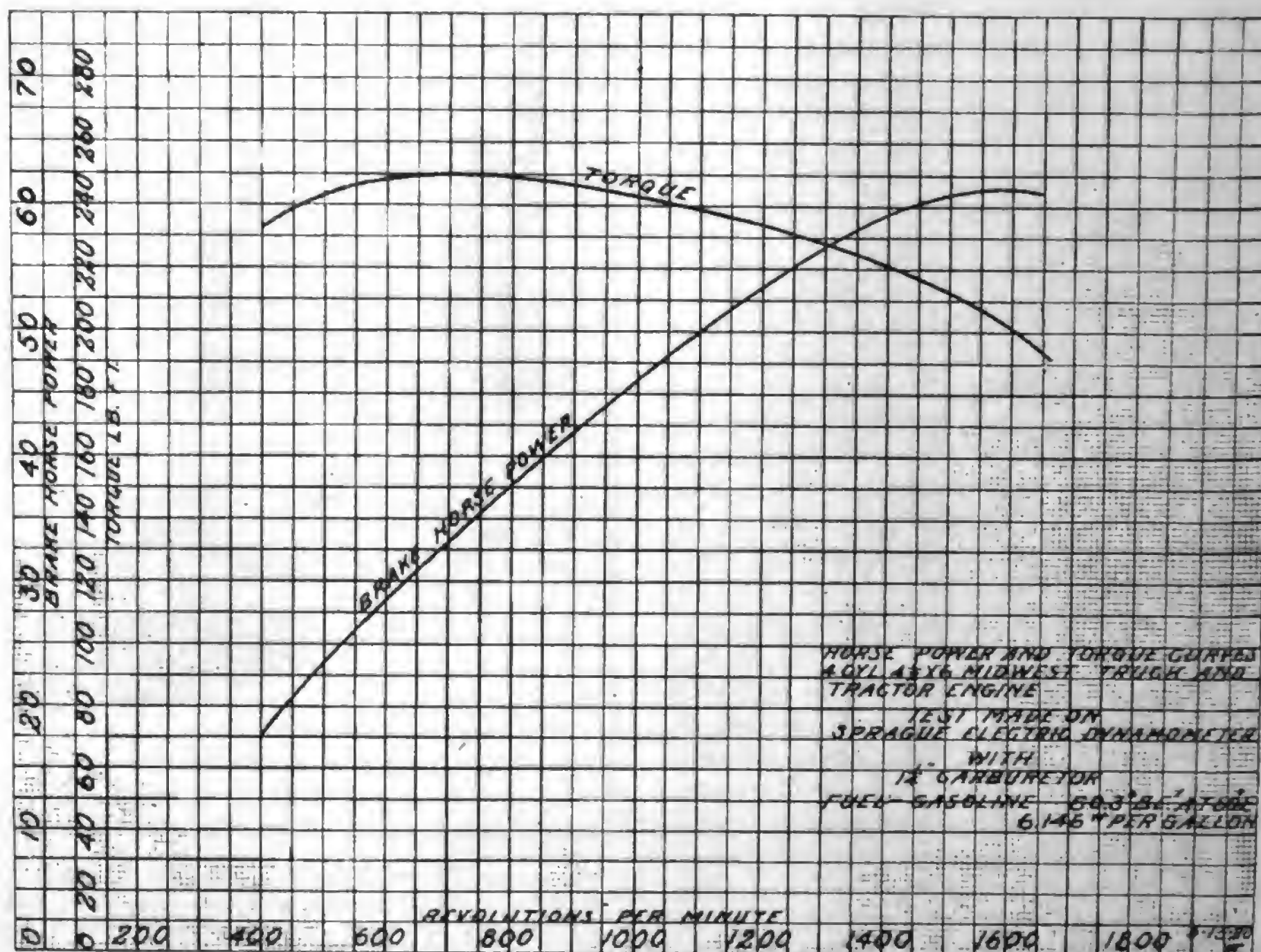
are now using these engines as standard equipment. Several thousand of these engines have gone into service, with the result that the common verdict has been that, in spite of claims for extraordinary performance, which at first seemed greatly exaggerated, it was found that the engine actually does more than was claimed for it. The comparative performance indicated above is additional evidence handed the company by one of

inch rear and 34 by five-inch front tires.

The bore and stroke of the Midwest Model 408 engine is given as 3½ by five inches.

The gear ratios are: High, one to one with a rear axle reduction of 7¾ to one; second, 1.72 to one; first, 3.88 to one; reverse, 4.84 to one.

The weight of the chassis, complete, with body, cab and windshield, is given as 5560 pounds.



Typical Chart of Midwest Engine Indicating High Torque and Maximum Brake Horsepower as Shown by Sprague Dynamometer.

REVOKES 29 IN ONE DAY.

BOSTON, MASS., Nov. 10.—Twenty-nine automobile drivers' licenses were recently revoked by State Registrar of Motor Vehicles Frank A. Goodwin, on the ground that their holders were guilty of operating cars while under the influence of liquor. This is the largest number ever taken away in a single day for that cause in this state. In a number of instances the men involved had figured in collisions or other accidents.

Registrar Goodwin, in a statement condemning the taking of even one glass of whiskey by a person about to drive a car, declared that much of the liquor extant

was "moon shine" and the state chemists had reported that it was hard to estimate the effect of even one drink of such stuff upon the system. Temporary loss of sight some times follows drinking of "moon shine," according to Mr. Goodwin, and that momentary blindness is often enough to cause collisions on the crowded highways.

This record batch brought the number of revocations on account of intoxication up to 63 for the week. In the whole month of October, 1919, only 55 licenses were revoked for such cause.

Of the 29 in question, 27 lost registration certificates and license cards. Two who had no licenses were deprived of their right to operate machines.

BRISCOE FORMS COMPANY.

DETROIT, MICH., Nov. 10.—Benjamin Briscoe, who recently severed his connection with the Briscoe Motor Co. of Jackson, has incorporated an automobile engineering company to do business in Detroit. Its address is given as Book building.

The company is incorporated for \$205,100, having only \$100 of common stock and 25,000 shares of no par stock. Of the no par stock 5000 shares are to be sold for \$1 each, going to the organizers only. The remaining 20,000 are to be sold for \$10 each. Only the 5000 shares to be held by the organizers carry authority to vote for members of the board.

Duplex Four-Wheel Drive Truck

Adapted to Difficult Service—Traction Obtained from Four Wheels Instead of Two—Used in Logging and Oil Regions; Also for Railway Service:

SUCCESS of the four-wheel drive principle, as exemplified in the motor truck manufactured by the Four-Wheel Drive Auto Co., Clintonville, Wis., has been amply proven in the many lines of motor truck hauling in which this now famous line of trucks has been engaged for the last few years or since its inception. Four-Wheel Drive trucks are at present used extensively in lines of service where the hauling is particularly difficult or the roads over which they are forced to travel is in anything but good condition. In the lumber regions of the northwest they are employed in hauling saw logs from the forests to the saw mills. In the South they are also seen in the same line of service, often hauling a train of trailers over a temporary rail line made of timbers and scantlings, or with squared-edge stock used for the rails.

DDOUBLE-FLANGED wheels are fitted to the truck instead of the regular wheel rims, and with trailers fitted in a similar manner are thus enabled to haul unusually heavy loads.

As a motor truck the Four-Wheel Drive possesses features peculiar to this type of construction which enable it to negotiate with ease roads which are practically impassable for the ordinary two-wheel drive truck. Driving, as it does, through all four wheels, better traction is obtained and the truck is enabled to perform, with almost animal action, feats which seem well nigh impossible.

A Wisconsin engine, Model A, of T-head construction, furnishes power for the Four-Wheel Drive truck, the bore being $4\frac{3}{4}$ inches and the stroke $5\frac{1}{2}$ inches, with a piston displacement of 398.8 cubic inches, giving a rated horsepower of 36.1. The engine is of ample size, provided with unusually large water jackets around the cylinders, valves and plugs. The reciprocating units are made of the highest grade steel especially designed to give long service and to withstand hard usage. Tungsten steel is used for the valves, which require regrinding only at long intervals. Spring retainers cover

and silence the valve operating mechanism, while the valves are lifted three-eighths of an inch by a cam-actuated tappet of the roller type. The cam shafts, which have the cams forged integral, are each supported by three bronze bearings, and are driven by helical gears from the crank shaft at the front end.

The crank shaft is a three-journal type, having main journals of ample size, consisting of a bronze shell lined with babbitt metal. The connecting rod bearings are of the same general construction, also lined with babbitt. The cylinders are offset three-quarters of an inch and the pistons are $6\frac{1}{4}$ inches long. Each piston is fitted with three rings above the piston pin, with four oil grooves on the skirt.

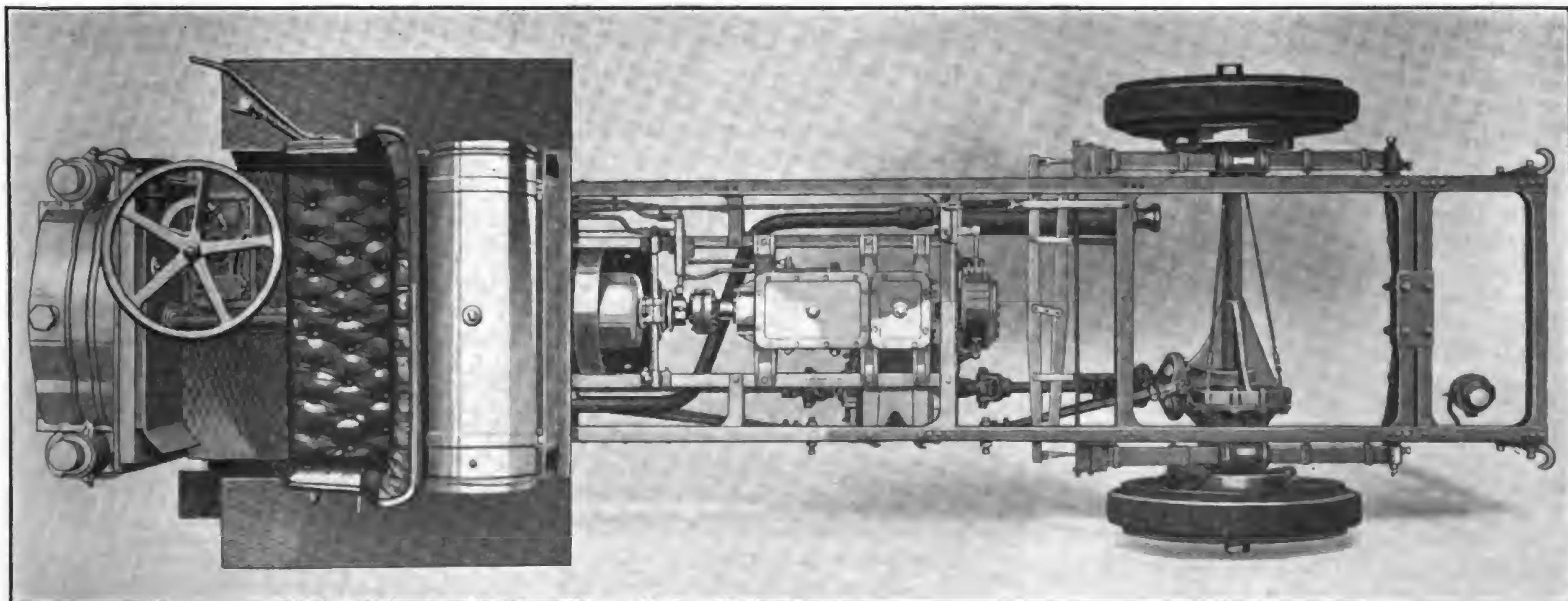
Lubrication is furnished by means of a combination force feed and splash system, which insures a constant supply of cool oil to every moving part. The oil is circulated by a gear pump located in the oil sump in bottom of crank case.

An even temperature of the engine cylinders is maintained by the water passing into the cylinders directly below the exhaust valves, then around the intake side, and out at the top of the cylinders.

Accessibility is strongly featured in the Wisconsin engine and it is possible to remove the valves, clean off the carbon, adjust the bearings and perform many other important jobs around the engine without taking it from the chassis frame. Accessibility signifies time and labor saved when properly incorporated in engine construction.

The cylinders are cast in pairs and may be removed from the crank case if necessity requires. The cooling system consists of a special MacCord radiator of the plain tube type located in the conventional position, a circulating water pump of the centrifugal type driven from helical gears in the timing gear set and a large four-bladed fan. Carburetion is supplied by a Stromberg carburetor with fuel fed by gravity from the main tank under the driver's seat.

Ignition is furnished by an Eisemann high-tension magneto fitted with an impulse starter, while the engine is governed by a Pierce governor driven from the rear end of the exhaust cam shaft through a flexible shaft to the governor which is connected to the intake manifold. The maximum speed of the engine is limited to 1350 revolutions a minute.



Aero View of Duplex Four-Wheel Drive Chassis Showing Position of Units, Method of Final Drive, Location of Transmission and Method of Applying Power to the Axles—Single, Solid Rubber Tires Are Used as Traction Is Equally Applied to the Road Through All Four Wheels, Enabling Truck to Surmount Obstacles Which Would Otherwise Be Impossible.

The governor actuates a valve located in the intake manifold above the carburetor which closes the passage at the engine speed for which it is set.

The clutch is a Hele-Shaw type, protected from dirt by a pressed steel case in which it is enclosed, and which serves

As a retainer for the lubricant in which the plates of the clutch are constantly bathed. A clutch brake, which tends to smooth clutch action when the speeds are changed is incorporated in the clutch. Adjustment is provided which allows the clutch brake to act at any position desired. The power is transmitted from the clutch to the Cotta transmission through a fabric type of joint which is composed of three rubber impregnated fabric discs connected to two forged yokes, each of which has three arms.

At the rear end of the differential is fitted a lock which prevents loss of power, and provides a ready means of locking the differential when the operator desires to have all four wheels drive without differential action.

The bearings of the center differential

link belt silent chain, is constantly immersed in a bath of lubricating oil.

Unique Final Drive.

The front and rear axles are identical, except that the housing of the front axle is hinged at its outer end to permit moving the wheels for steering, and the full-floating driving shaft within is provided with a universal joint directly in line with the center of the housing hinge.

The front axle universal joint operates at wheel speed only, functioning efficiently at an angle of 27 to 28 degrees, and providing a turning radius of 25 feet three inches.

The axles are of the conventional full-floating type fitted with a straight-cut bevel gear drive. The front axle housing is of the full-floating type, with the exception that the housing at the wheel ends made, in the form of a ball, from a chrome vanadium steel drop forging. Forged integral with this ball, at the extreme top and bottom, are heavy pivots. Over the ball is fitted a crucible cast-steel socket divided into upper and lower half, the pivots and sockets being provided with case-hardened bushings riding in adjustable plugs. There is no contact between the inner surface of the socket and the outer surface of the ball, all the load and friction being carried on the pivots with their bushings and buttons. Together this ball and socket form the wheel ends of the axle housing. The axle shaft is identical with other types of full-floating axle shafts, except that, at the steering pivot it is made in a universal joint, housed within the ball and socket joint. This type of universal provides the steering flexibility for the driving shaft and the socket, riding on the pivots of the ball, provides steering flexibility in the housing.

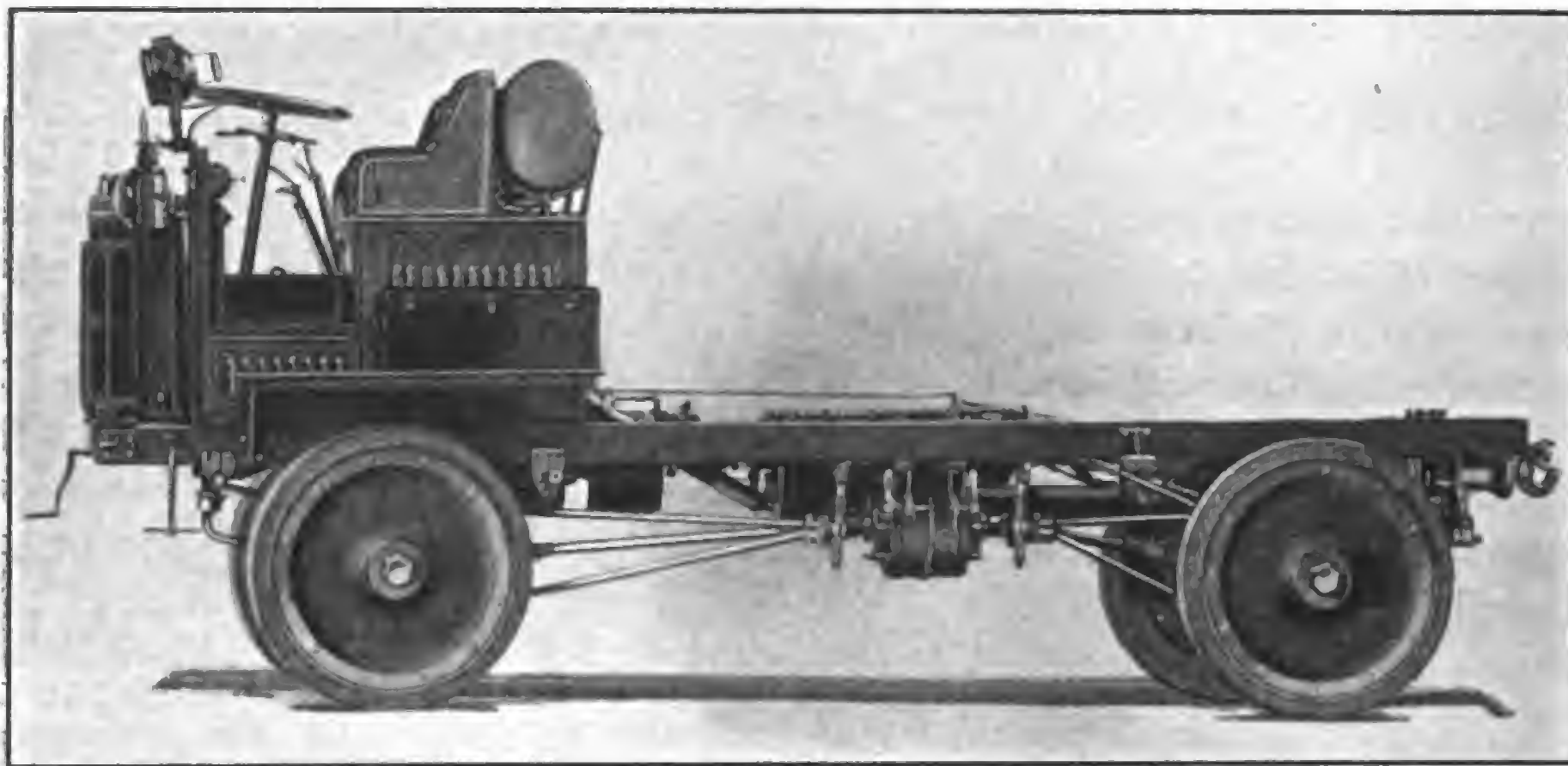
The total gear reduction at the axles is given as 8.9 to one, while on low it is 35.6 to one. A platform spring of ample size supports the rear end of the chassis frame, while semi-elliptic springs of large capacity suspend the chassis at the front. All starting and stopping torque in the axle housing is taken by a V-shaped torsion rod, which is spring cushioned above and below, thus relieving the chassis springs and prolonging their life.

The frame is of 9/32-inch heat-treated chrome nickel steel, pressed into a channel section having flanges 2 1/4 inches wide.

The emergency brakes are located on the rear wheel drums and are operated by a convenient handle at the driver's seat.

SPECIFICATIONS.

Capacity—Three Tons.
 Engine—Wisconsin "A."
 Bore and Stroke—4 1/4 by 5 1/2 Inches.
 Horsepower—36.1.
 Speed of Engine—1350 R. P. M.
 Ignition—Eisemann High-Tension, Impulse Starter.
 Carburetor—Stromberg.
 Clutch—Hele-Shaw, Oil Plate Type.
 Transmission—Cotta, Gears in Mesh.
 Tires—36 by Six-Inch, Front and Rear.
 Wheelbase—124 Inches.
 Turning Radius—25 Feet Three Inches.
 Speed Governed—15 Miles an Hour on High, Eight Miles on Second, Four Miles on First.
 Final Gear Ratio—Standard, 8.9 to One.



Side View of Duplex Truck Equipped with Dished Wheels Showing Additional Loading Space in Rear of Driver's Seat—Fuel Tank in Rear of Seat.

are of ball type of ample size, while each of the jack shafts is carried on ball bearings on its outer ends, the inner ends being carried in the differential side gears. The entire center assembly, including the

REAL COMPETITION.

SAN FRANCISCO, CAL., Nov. 10.—Automobile bus and truck competition has made the Pacific Electric railway of Los Angeles, "virtually ready for receivership," according to the report of the engineering department of the railroad filed with the state railroad commission recently. The engineering department will make a formal report of the findings developing from its recent survey of the Pacific Electric before the commission sitting in Los Angeles to hear the company's application for permission to raise rates. The department reported that the company's books show an accumulated deficit of \$13,443,444, ranging in annual losses from \$500,000 to \$2,767,726.31 for 1919. The annual return of money invested, the report shows, has fluctuated from 1.05 to 4.2 per cent., or in every case less than the interest on the money invested. An analysis of capitalization shows a total of \$91,346,000, consisting of \$34,000,000 common stock and \$57,436,000 of 17 different bond issues, with all common stock and \$27,031,000 par value of various bond issues in the hands of the Southern Pacific.

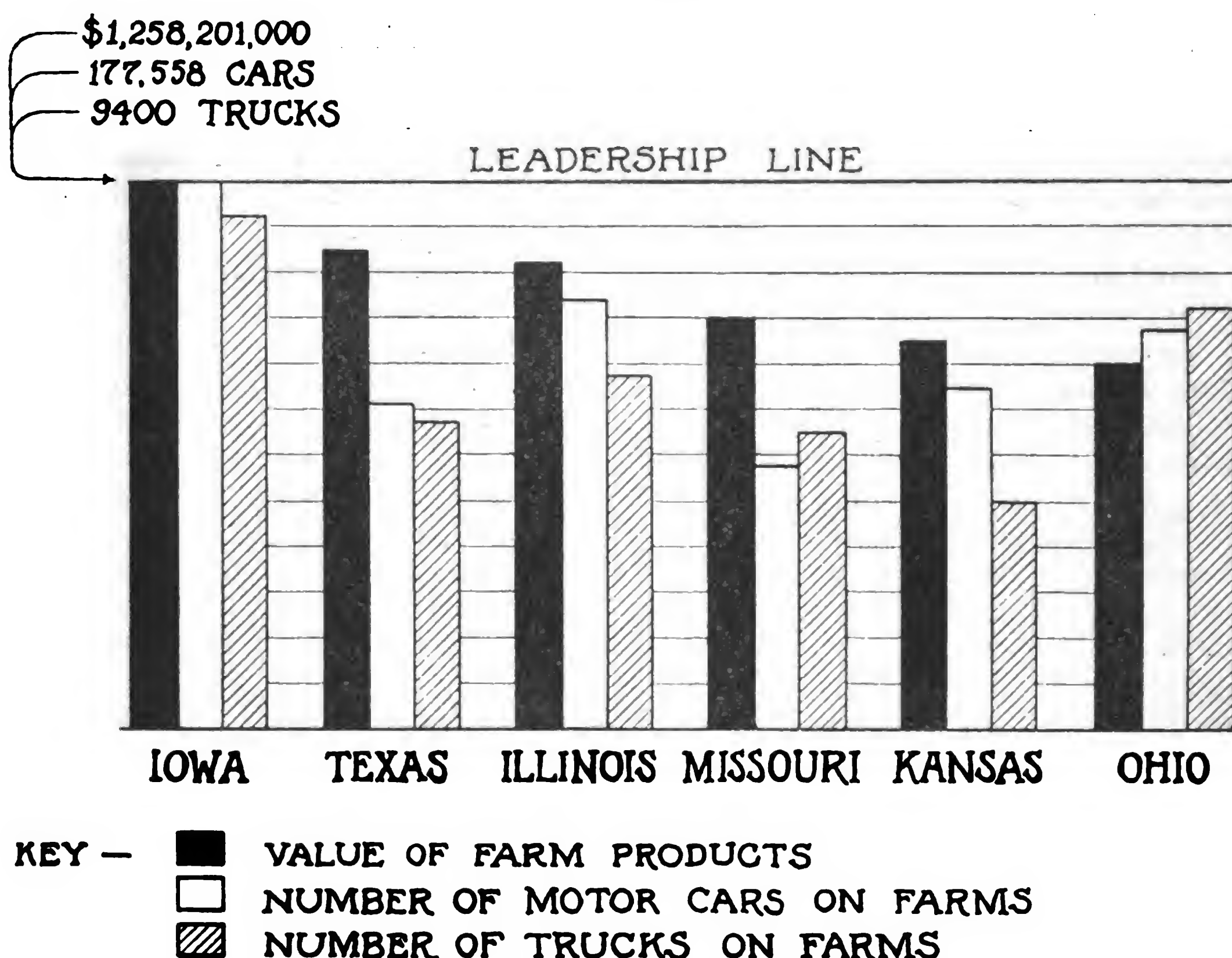
Transmission Gears in Mesh.

The Cotta transmission used in the Four-Wheel Drive truck is of the individual jaw clutch type, with gears always in mesh. Unusual strength is provided in this type of transmission and speed shifting is easily performed. The transmission case is constructed entirely of aluminum, and is placed amidship supported by heavy cross members at each end. The aluminum case is protected at the bearings by housing them in cast-iron members, which in turn are bolted to the aluminum of the case. All the bearings of the transmission are of the ball type, while the gears are 1 1/4 inches wide and guaranteed not to strip in use.

A center differential is provided in the Four-Wheel Drive truck instead of at the axles, as the construction of the axles makes it necessary to centralize the differential for the four wheels of the axle. The power is transmitted from the rear end of the transmission shaft through a silent chain, five inches wide, to the differential of conventional construction. This differential is located in the center of the chassis and the power is here divided and transmitted through a shaft to each axle.

The center differential is necessary in any four-wheel drive to compensate for the difference in distance traversed by the front and rear axles in rounding corners or travelling over uneven ground. Without this rapid tire wear and early fatigue of metal results.

RELATION OF MOTOR VEHICLES ON FARMS TO CROP VALUES



I NVESTMENT in motor transport and high-value products go hand in hand, according to comparison of government figures on crops and motor vehicle registration on farms as shown by the above chart.*

Iowa, Texas, Illinois, Missouri, Kansas and Ohio are among the first 10 states leading in value of farm products, and are also among the first 10 leaders in farm motor vehicle registration. Iowa, in fact, is a banner state agriculturally and in motor transport. She is first in value of farm products and also of farm owned trucks.

MOTOR trucks on farms totalled 131,551 on Jan. 1, 1920. Registration of commercial vehicles is heaviest in Pennsylvania and New York, regions which have a heavy truck gardening business and well developed roads.

The totals are as of Jan. 1, 1920. The United States Bureau of Public Roads reported a gain of 22 per cent. in the registration of all motor vehicles during the year 1920. If the farm registration increased in this ratio the farm registration of motor cars today is 2,618,744, and of trucks 169,786. Sales reports of car manufacturers, however, indicate that the heaviest sales for 1920 were in rural regions, so that the general ratio is probably too light for the farm sections, and the total of motor cars and trucks on farms may be as high as 3,000,000.

The 10 states leading in farm wealth and automobile registration, according to various classifications are as follows:

Leading in Value of Farm Products.

State	Value of Farm Products
1. Iowa	\$1,258,201,000
2. Texas	1,101,610,000
3. Illinois	1,074,879,000

*Data compiled by N. A. O. C.

4. Missouri	942,092,000
5. Kansas	888,056,000
6. New York	876,207,000
7. Ohio	831,009,000
8. Pennsylvania	733,971,000
9. Wisconsin	708,100,000
10. Indiana	700,121,000

Leading in Car Registration on Farms.

State	No. of Cars in Farms
1. Iowa	177,558
2. Illinois	139,090
3. Ohio	128,384
4. Kansas	111,055
5. Minnesota	107,824
6. Texas	105,292
7. Nebraska	104,453
8. Wisconsin	98,825
9. Missouri	86,229
10. California	71,518

Leading in Average Value of Products Per Farm.

State	Average Value of Products Per Farm
1. Nevada	\$10,378
2. Wyoming	7,874
3. Iowa	5,899
4. California	5,656
5. New Jersey	5,557
6. Nebraska	5,456
7. Kansas	5,372
8. Massachusetts	4,772
9. South Dakota	4,603
10. New York	4,538

Leading in Farm Registration of Trucks.

State	No. of Trucks on Farms
1. Pennsylvania	9,372

2. New York	9,259
3. Iowa	8,910
4. Ohio	7,319
5. Nebraska	6,548
6. California	6,416
7. Illinois	6,154
8. Texas	5,399
9. Missouri	5,059
10. Michigan	4,886

Leading in Per Cent. of Farms Owning Cars.

State	Per Cent. Farms Owning Cars
1. Nebraska	75.6
2. Iowa	73.1
3. South Dakota	69.4
4. Kansas	62
5. Minnesota	57.1
6. North Dakota	56.7
7. California	53.1
8. Colorado	47.3
9. Arizona	45.5
10. Nevada	45.4

Leading in Per Cent. of Farms Owning Trucks.

State	Per Cent. Farms Owning Trucks
1. District of Columbia	14.2
2. Rhode Island	11.5
3. New Jersey	10.4
4. South Dakota	5.7
5. Arizona	5.3
6. Maryland	5.3
7. Nebraska	5.1
8. Nevada	5.1
9. California	5.0
10. Colorado	4.8

PERTINENT POINTED

LITTLE doubt exists in the mind of the average person of the present-time efficiency of motor truck transportation for short and medium haul service. Certainly the last few years have amply demonstrated this to the extent that it may well be spoken of and used as a basis of conjecture quite as may any other well-established fact. But what will be the eventual outcome? What place will the motor freight carrier finally assume in the country's business? Certainly the first consideration, the one paramount to all others in the effective development and growth of this very desirable method of moving goods, is proper highway conditions. Should the commercial hauler continue to improve mechanically during the next few years as it has during the last half-decade, there is good reason to believe that it will soon reach a point where it will be the most economical and efficient form of intercontinental freight transport—this, provided the roads are available.

GOOD roads are expensive to build, and costly to maintain once they have been constructed. This expense, while it is as nothing compared with the results that may eventually be obtained, presents what may well be called the only real stumbling block that the automotive industry has encountered to date. Restrictive legislation can be combatted, and the perplexing problems engendered will settle themselves, but it is obvious that freight transportation can only grow through the establishment of proper highway systems. Who is going to build them? Twenty years ago this problem called for little attention. Communities built and maintained their own roads. The matter was purely a local one and was disposed of in exactly the same way that other community business was handled. But the coming of the automobile has changed all this very materially, and the subject of road building has assumed proportions that call for an entirely different handling of what is manifestly one of the most important issues of the day.

The greatest minds in the country have debated this subject and the prevailing opinion appears to be that the matter has outgrown community and state control, and that the federal government should take over the entire work, insofar as it applies strictly to highways connecting cities, leaving the smaller tributaries to the care and maintenance of the state, county and town authorities. Material evidence tending to prove the foregoing is seen by the fact that road projects in 18 states, totalling more than 265 miles and costing an aggregate of \$7,693,778, or an average of almost \$30,000 a mile, were approved during July by the Bureau of Public Roads, United States Department of Agriculture, for federal aid, according to the bureau's publication, "Public Roads," just off the press. The total of

federal aid approved for these projects is placed at \$3,023,152, the remainder of the cost being borne by the states.

All told, there were 56 such projects approved during the month. New York led with 20, Pennsylvania came second with seven, and Kentucky and South Carolina were tied for third, with five projects each. Four Texas projects were approved; New Mexico, Washington and Wisconsin had two each; and Arizona, Arkansas, Kansas, Maine, Massachusetts, Michigan, Mississippi, Oklahoma, Tennessee and Virginia each had one project approved during the month.

The Phipps-Dowell-Robison bill continuing the Federal Aid Road act of 1916, which expired in June this year, has passed the House and Senate and is now in conference. The House measure did not contain an appropriation, but many of its provisions were accepted by the Senate. The upper branch of Congress appropriated \$75,000,000 to be matched with a like sum by the states.

It seems safe to venture a prediction that within a very few years the entire expense of building these roads will be taken care of by the Treasury Department at Washington. And when that time arrives the motor truck as a freight carrier will have truly come into its own. Speed the day!

PRICE FLUCTUATIONS.

THIS is a dangerous topic and one which we approach with trepidation. Nevertheless, there is no reason why it cannot be touched on if care is taken and the discussion confined to generalities. Right now one hears a general tone throughout the industry to the effect that rock-bottom prices have been reached and that the next readjustment—if the word fits—must be upward. Of course it is possible that there are still

COMMENT OF THE DAY

certain isolated companies that may reduce still further, but taking labor and stock costs into consideration it seems as though the representative companies had gone about as far along the reduction road as they are likely to. This, of course, is merely a conjecture, although it is based on several well authenticated truths, chief of which is the fact that many of the larger companies, through their contribution to better business, are operating on a very small basis of profit. The rules of industry are determined by certain well-defined facts which are dictated by the mathematics of dollars and cents. Romance is a negligible factor in business and there is small room for ideals that do not recognize the principles of profit and loss. Therefore, regardless of whether the manufacturer might wish to make an even lower price for his product, he can go no further than his cost accounting system allows, and it almost seems as though this limit has been reached.

The predicted rush of business for motor truck manufacturers, contingent on the great highway construction programme outlined some six months ago, has unfortunately not come to pass because road-building materials and labor have not been available at the price predicted and many of these building plans as a result have been disrupted, only a small proportion going forward at the present writing. But this work has merely been delayed and eventually will be taken care of. In fact, many of the big men in the industry look forward to the coming spring as a record breaker, due to the fact that much of this highway building undoubtedly will go forward at that time. This will mean higher prices according to the way we view the situation, although we cheerfully admit that we may be wrong.

Our reason for making this assertion, however, is very simple and is merely a matter of using such common sense as we may possess. Here's the idea: A great many of the motor truck manufacturers had an admittedly high inventory at the end of the war and this inventory was reflected by many of them even up to the time that price-cutting became general. Business has been somewhat dull and these manufacturers, themselves waiting to share in lowered prices for materials have made hand-to-mouth purchases. In the spring when the rush is due they will have little material on hand and will be forced to pur-

chase what they use wherever they can get it and at the price asked. They have been building few trucks and this will mean that production must start up on an over-time basis. As a consequence of these two conditions it seems very natural to presume that the manufacturers may have to raise their prices to take care of their profits. Thus, prices may advance and in addition to this there also may be a marked shortage of trucks. Therefore, after summing up the matter, one feels justified in saying that it is just within the bounds of possibility that he who buys his truck this winter may find that he has saved some money.

PRECEDENT AND JUSTICE.

“PRECEDENT establishes custom, style dictates style, but both respond to the lamp of truth.” This liberal English definition of an old Japanese proverb contains much that is true, but its preachments seem almost never recognized by those who make the laws regarding the operation of motor vehicles. Occasionally, however, one finds complete justice being accorded, and an instance illustrating this has come to the writer's attention within the week. The old line State of Connecticut is the source from whence emanates this latest example of equal rights, the text of which is contained in “An act concerning pedestrianism upon highways.” This enactment provides as follows:

“Any pedestrian who shall use any street or highway negligently or recklessly, or who shall willfully refuse or neglect to obey the signal of any traffic officer, or who shall recklessly disregard his own safety or the safety of any person by the manner of his use of any street or highway, shall be fined not less than \$2 nor more than \$25 for each offense.”

Why shouldn't the motor vehicle have at least the same rights to the use of the street as is accorded the foot passenger? The real reason that this right is often overlooked is simply another case of custom established through precedent—in other words, the pedestrian came first. The “lamp of truth” will probably have to shine some years before matters are completely adjusted, but it is mighty nice to be able to record a first step along the right path.

Russel Develops New Axle Line

Many Improvements Embodied in This Latest Design
of Internal Gear-Driven Components for Trucks—
Manufacturer Increases Production.

RUSSEL MOTOR AXLE CO., Detroit, Mich., a division of the McCord Manufacturing Co., Inc., the well-known manufacturer of radiators in Detroit, has during the depression of the past year been quietly developing new designs of internal gear-driven axles. The development work is completed, and the new models are now in production. All of these models possess the same characteristics and have many improvements. They will be made for the following size trucks: One-ton, 1½-ton, two-ton and 2¾-ton. With the exception of the 1½-ton, they will replace the former P, S and U axles. The 1½-ton model is, however, entirely new and is intended to take care of the demand that many truck builders have felt recently.

IMPROVEMENTS possessed by these axles may be briefly summarized as follows: Spiral bevel driving gears are used on all models, obtaining a degree of quietness unobtainable with straight-cut teeth. In models 3000, 4500 and 6000, the pinion shaft is machined with 10

way of increased production, together with improved workmanship. The heat-treating facilities have been more than doubled, special equipment installed and the machinery rearranged to reduce the excessive handling of material.

These changes have reduced the oper-

brakes are of the full wrapping type and this, coupled with their large diameter, is conducive to the long life of the lining and to ease of operation.

The housing is of pressed steel, reinforced with a heat-treated chrome nickel tube of 5/16-inch wall, extending from the wheel bearing to within seven inches of the axle center. In addition to being electrically welded, the web in the housing is riveted, and the bolts used to secure the third member extend through and are threaded into the housing. The cover is so designed as to pilot in the housing in a manner similar to that used for the third member, thus effecting a very rigid center construction.

The semi-floating type of axle shaft mounting is used, the outer bearing being a double-row annular ball New Departure No. 311 size. Radex bearings, No. 0212, are mounted on the differential with New Departure single-row, and No. 308 double-row ball bearings on the bevel driving pinion. Two gear ratios are obtainable, 6.33 to one or 5.33 to one. The former has a six-tooth pinion, meshing with a 38-tooth gear, while the latter has a seven-tooth pinion meshing with a 37-tooth gear.

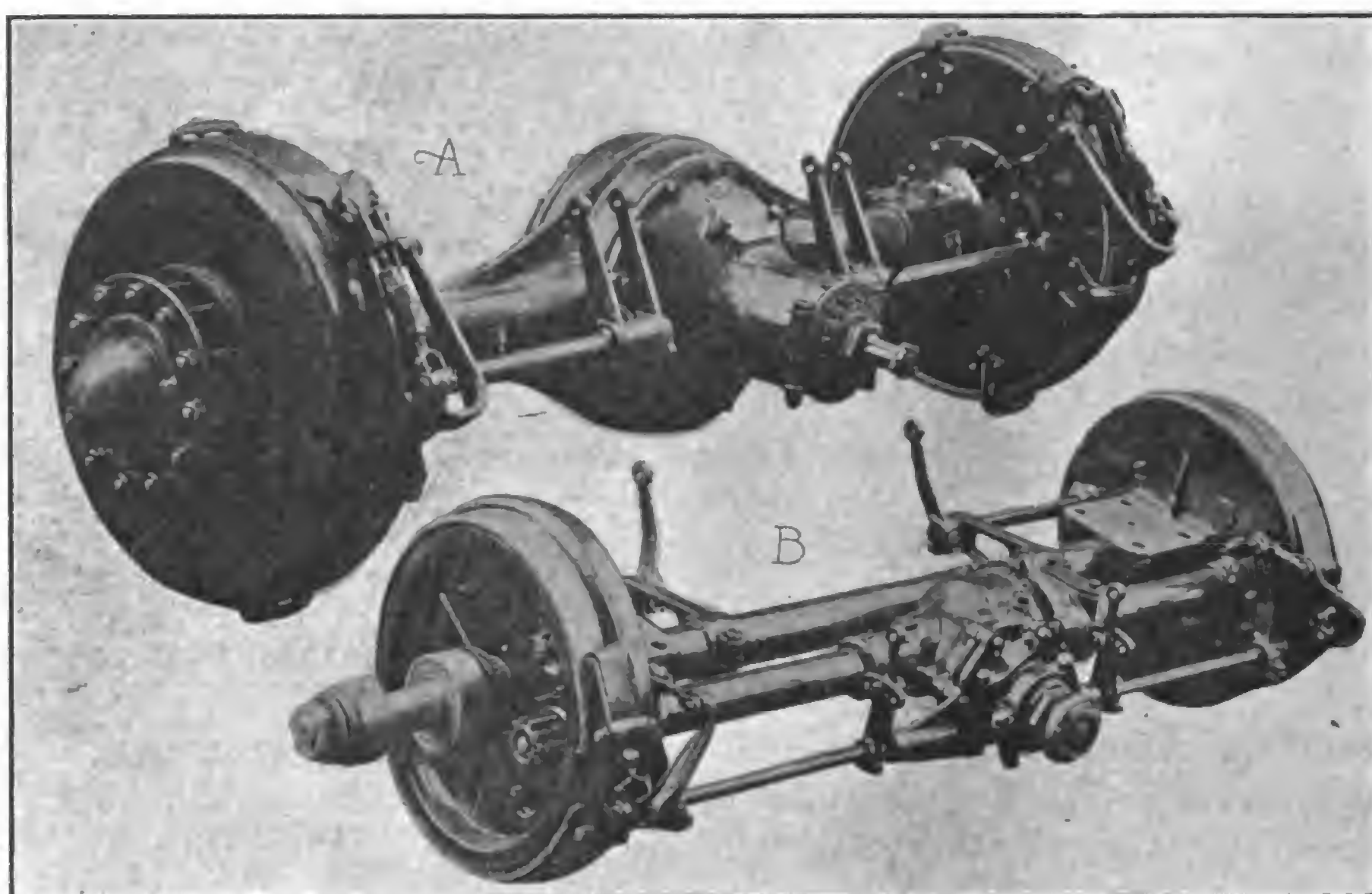
The hubs are mounted upon the axle shafts by means of a taper and a spline. The regular construction is for wood wheels, but ribs for Distel or any other type of disc wheel can be furnished, the manufacturer states.

Three-Quarter-Ton Axle.

In the ¾-ton bevel gear axle the same gear ratio will be used, but New Departure No. 310 double-row bearings will be used for the wheels, and also a smaller differential. The axle housing will be of the same shape and material, but will be reinforced with a chrome nickel tube of 7/32-inch instead of 5/16-inch wall. The brake drums are 16½ inches outside diameter fitted with the same type of brakes as on the larger axle. In appearance, both axles are very similar, the only outstanding difference being the size of the brake drums.

NEW HY-SPEED AGENCY.

CINCINNATI, O., Nov. 15.—The Cincinnati Hy-Speed Co. has made an exclusive selling arrangement with the Niles-Bement-Pond Co., covering the full line of Hy-Speed products.



A, Live Axle Designed for Light Three-Quarter Ton Speed Trucks; B, Internal Gear Drive Axle Designed for 1¼-Ton Speed Truck Has Many Special Features Which Recommend It—Both Axles Mounted on Ball Bearings of Large Proportions.

splines for the universal joint flange, while the model 8500 axle has a taper for the flange. On all models an improved four-pinion type of differential is used in connection with hardened and ground thrust washers.

The jack shaft pinions are mounted upon the jack shaft in such a manner as to permit removal without disturbing the jack shaft. An enclosure for this pinion is provided, while a casing for the internal gear and jack shaft pinion is fitted to protect these parts from dirt, and also to retain the lubricant. The operating mechanism for the external brake has been greatly improved and an adjustment for the brake lever is provided. Provision is made for adjusting the wheel bearings, in accordance with the recently adopted S. A. E. recommendations.

In connection with the new designs a great deal has been accomplished in the

ating costs sufficiently to permit the improved axle to be sold at a price no higher than was necessary for the former models.

Model 3600-B Bevel Gear Axle.

The new 1¼-ton bevel gear axle is intended primarily to meet the demand of manufacturers making a high-speed truck of 2500 pounds capacity, having a spring pad capacity of 4600 pounds, permitting an ample overload margin for a normal truck equipped with pneumatic cord truck tires.

The brake drums are unusually large, being 18 inches outside diameter, and are fitted with both internal expanding and external contracting brakes. The internal brakes have a two-inch width and are toggle operated, making them extremely powerful, while the external brakes have a three-inch width. Both the internal expanding and the external contracting

Pays for Itself in 18 Months

Acme Five-Ton Truck Gives Good Service on Road Work in Middle West—Accurate Figures Kept of Expense of Operation Show Good Profit.

IT IS interesting to note the experiences of various truck owners in various sections of the country, as it shows in concrete form just what their machines are doing in the way of operating economically and the manner in which they perform their work. It is somewhat difficult to find owners who keep a record of their truck operating expenses, but the few who do find themselves well repaid for the small amount of time spent daily in entering the various items on the monthly sheet, especially when these figures are on the profit side.

In Detroit, Mich., there is a five-ton Acme, equipped with a hoist and steel dump body, which its owner, G. A. Van Dusen, states has paid for itself in 18 months of service.

THE truck was purchased in September, 1919, and since that time has not only paid for itself, but made for its owner a good living. The truck was equipped especially for road work, but it has been used on various other jobs, such as road building, excavating, hauling building supplies, etc., in Michigan, Indiana and Illinois. During the 18 months of operation the truck has travelled 18,704 miles and averaged around 35 miles a day.

The mileage per day depends on the job. Some haulage jobs averaged around 80 miles a day while, in handling building supplies and ordinary hauling, the average is only 20 to 25 miles a day. The length of time spent on various jobs also varies. Some jobs last two or three days, while others may continue two or three months.

During the year ending March 1, 1921, the truck travelled 9456 miles in 270 days. This, figured on the basis of the National Standard Truck Cost System, made the operating cost \$16.05 a day, including \$5 a day for the driver and \$400 a year allowed for maintenance and repairs. It was found that the operating costs varied according to the work done. One day 14 loads of asphalt was hauled a distance of 1½ miles, making an average of 7.3 tons per load. The cost of operation for this day's work was as follows:

Variable expense, 42 miles at 23.69 cents	\$9.95
Fixed expense, one day	2.76
Driver's wages, one day	5.00
Total operating cost per day	\$17.71

Hauling 102 tons on this day made the cost of hauling 17.3 cents per ton and 11.5 cents per ton-mile. The usual day's work on this job was 11 trips, but on this particular day 14 trips were made.

On another job gravel was hauled a distance of 8½ miles, making the round trip 17 miles. As four loads were hauled per day, 68 miles were covered. The roads were paved all the way, and part of the way the haul was over city streets. The cost was as follows:

Variable expense, 68 miles at 23.69 cents	\$16.10
Fixed expense, one day	2.76
Driver's wages, one day	5.00
Total operating cost per day	\$23.86

Six cubic yards were averaged to the load, approximating eight tons. The cost per cubic yard was 99 cents, or 11 cents per cubic yard-mile. The cost per ton was 74½ cents, or 8.7 cents per ton-mile.

AVERAGE COST OF OPERATING FIVE-TON ACME FOR 270 DAYS.

Cost per day (includ driver)	\$16.05
Cost per mile .....	.4585
Total cost for period	4,335.93



Five-Ton Acme, Used by G. A. Van Dusen, Detroit, Mich., in General Haulage Service, Makes a Good Living for Its Owner Besides Paying Its Way.

On a certain road-building job the usual haul was 10 loads a day a distance of 3½ miles, making 70 miles a day. The roads were good, though slightly hilly. The costs were:

Variable expense, 70 miles at 23.69 cents	\$16.58
Fixed expense, one day	2.76
Driver's wages, one day	5.00
Total operating cost per day	\$24.34

As the truck hauled six cubic yards per trip, the cost was 48.5 cents per cubic yard and 11 cents per cubic yard-mile.

During the first year of operation the truck proved a large source of profit. Plenty of work was at hand and Mr. Van Dusen was able to command \$1 a yard, or \$4 an hour, according to the nature of the work.

The average of daily expense is as follows:

Operation.

Days operated	270
Miles travelled	9456
Miles per day	35.02
Miles per gallon of gas	4.5
Miles per gallon of oil	150

Itemized Cost.

Driver cost per day (included above) ..	\$5.00
Depreciation per mile .....	.1128
Maintenance and repair, estimated per mile .....	.0423
Tire cost, actual, per mile .....	.0172

APPOINTS DISTRIBUTOR.

WABASH, IND., Nov. 12.—The Service Motor Truck Co. announces the appointment of the Pennsylvania Motor Sales Corporation of Pittsburgh, Pa., as distributor for Service motor trucks in the western Pennsylvania territory.

The distributor is well qualified to handle the company's business in what is admittedly a productive area.

Pampering the Pie Penchant

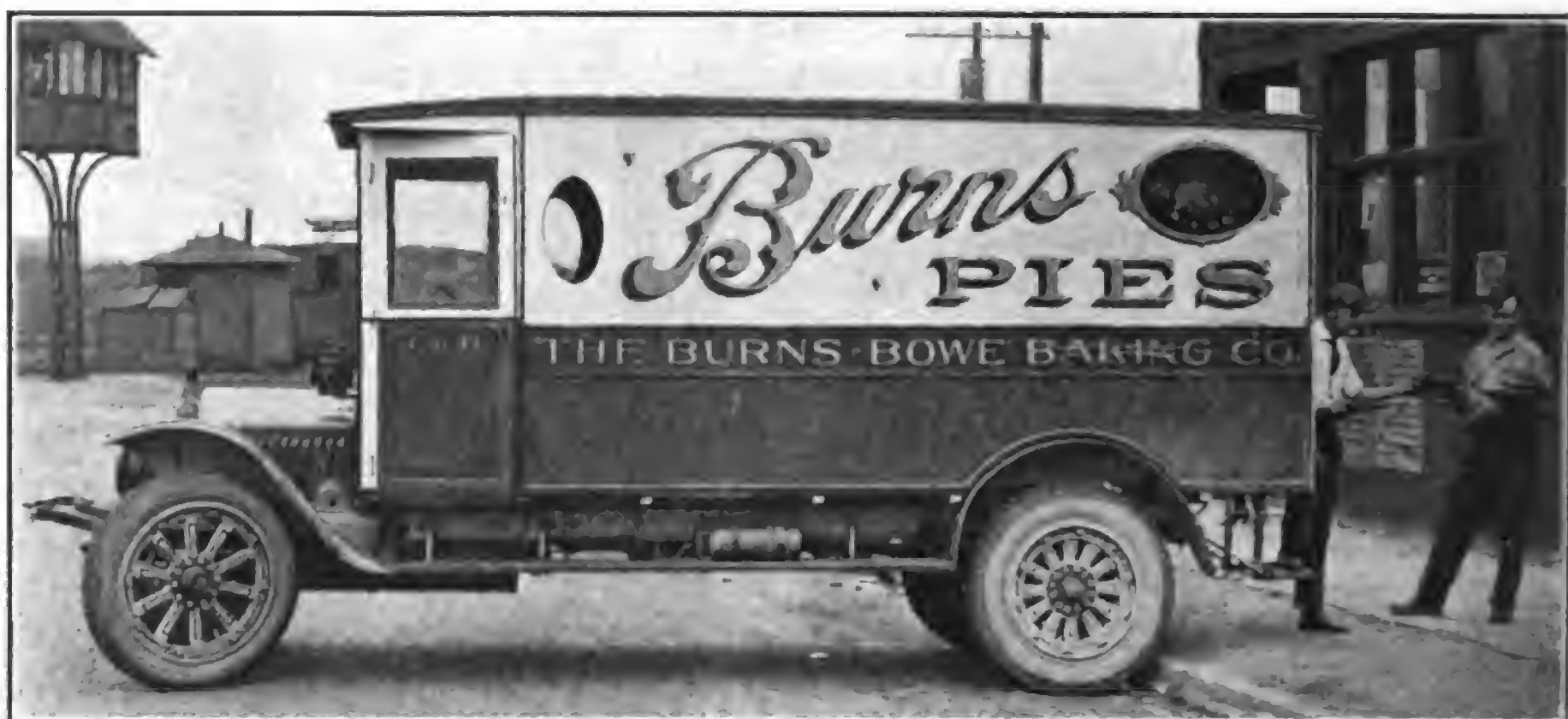
Cleveland Baking Business Becomes One of Largest Pastry Concerns in Middle West—Quality of Product and Reliability of Delivery the Chief Factors.

FORTY years ago Cleveland marts knew a familiar figure who, basket on arm, daily made the rounds of restaurants and small shops in the central district, distributing pies. And they were good pies, too. Hence it wasn't long until business had outgrown the pedestrian stage; but the man who made the pies still delivered them, only now he drove a wagon. Today, J. H. Burns—that man—is president of the Burns-Bowe Baking Co., Cleveland's largest pie-baking concern, whose wagons and motor trucks daily supply 700 restaurants and shops, not only in greater Cleveland, but in cities and towns within a radius of 50 miles, as well, with 30,000 pies of 20 different varieties. Two machines, designed by Mr. Burns, turn out pies ready for the ovens at the rate of 42 a minute.

FROM the torrid depths of six ovens, each with a capacity for 500 pies, wafts the appetizing aroma of pastry in every stage of baking, from the gradual warming of the first minute to the crisp and inviting brown of the 20th minute. Long, flat paddles, deftly wielded by expert hands, are constantly reaching into the narrow mouths of the six ovens and emerging with a trio of juicy, bubbling pies. In their place go three new, dough-white, raw pies. Twenty minutes later, having completed a trip around the oven interior on the slowly revolving "shelf," they, too, emerge "piping" hot and deliciously brown.

"You see how those pies go 'round and 'round?" queried T. L. Terrell, sales manager for the Burns-Bowe Co. "Well, our entire business moves the same way. In other words, our business does a complete cycle every 24 hours. For we not only bake the pies, but sell them, distribute them and collect the money the same day."

Long before the city is fully astir in the morning, seven faithful White trucks and a flock of delivery wagons set out on diverging paths from the Burns-Bowe bakery, six days a week. The wagons blanket the short-haul, frequent stop district of down-town Cleveland. But the motor trucks, fleet and rugged, have long



One of the Many Delivery Wagons of the Burns-Bowe Baking Co. of Cleveland, O., by Which the "Pie Belt" Is Being Broadened to Include That Section of the West.

distances to travel and often challenging roads to traverse ere they reach the mouths of trade.

The five-ton White of the Burns fleet does not stop until it reaches Akron, where it delivers 4400 pies daily. It averages 76 miles a day on the road. Five two-ton White trucks deliver to Lorain, Elyria and South Lorain, Collinwood, East 105th street to Wickliffe, and southeastern Cleveland, including Bedford, North Randall and Chagrin Falls respec-

tively. Each truck averages half a hundred stops a day delivering 800 pies.

"Then we have another two-ton White, now on relief duty, that has done 65,000 miles for us in the three years we have had it and so many more for its first owner before being rebuilt that I hesitate to venture a guess as to its life-time mileage," declared Mr. Terrell. "During the severe storms of two winters ago, that veteran acted as pathfinder for Cleveland (Continued on Page 581.)"

"A NEW MAN ON AN OLD JOB"



There Is a Marked Contrast Between the Cost of the Work Done by This Modern Sprinkler and Its Predecessor.

A Calendar of Conventions, Exhibitions and Fairs of Interest to the Trade

That the Automotive Industry Continues to Grow Despite Adverse Conditions, Is Exemplified by the Increasing List of Events at Which Its Products Are Featured.

Nov. 3-5—Omaha, Neb., International Automobile Congress.

Nov. 4-12—London, England, British Motor Show, Society of Motor Manufacturers and Traders.

Nov. 7-14—Paris, France, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Under Auspices of the Chambre Syndicale Industries Aeronautiques.

Nov. 8—Elkins, W. Va., Semi-Annual Meeting, West Virginia Automobile Dealers' Association.

Nov. 11-19—Little Rock, Ark., Automobile Show, Little Rock Automobile Dealers' Association.

Nov. 12-17—Jacksonville, Fla., State Fair.

Nov. 14-19—Chicago, Ill., Annual Convention and Business Exhibit, Automotive Equipment Association, Coliseum.

Nov. 14-19—Jersey City, N. J., Second Annual Jersey City-Hudson County Automobile Show, Fourth Regiment Armory, Under Auspices of Hudson County Trade Association; Passenger Cars, Trucks and Accessories; Fred W. Payne, Manager, 342 Madison Avenue, New York City.

Nov. 14-19—Washington, D. C., Enclosed Car Week.

Nov. 15-16—New York City, Semi-Annual Convention, National Automobile Chamber of Commerce Factory Service Managers; H. R. Cobleigh, Secretary.

Nov. 15-17—Kansas City, Mo., Second Annual Meeting, American Petroleum Institute.

Nov. 16-17—Indianapolis, Ind., First Annual Convention, Indiana Automotive State Association.

Nov. 18—Detroit, Mich., Meeting, Society of Automotive Engineers.

Nov. 21—Syracuse, N. Y., Meeting to Effect Preliminary Organization of New York State Association of Automobile Dealers.

Nov. 22-24—Chicago, Ill., Chicago Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 24—Los Angeles, Cal., Speedway Events.

Nov. 26-Dec. 3.—Shanghai, China, Automobile Show.

Nov. 27-Dec. 3.—New York City, Automobile Salon, Hotel Commodore.

Nov. 28-Dec. 2—Grand Rapids, Mich., Convention, Michigan Implement Dealers' Association.

Nov. 28-Dec. 3—Des Moines, Ia., Fourth Annual Tractor Show, Iowa Implement Dealers' Association, Coliseum; Trucks, Tractors and Power Farming Machinery. T. F. Wherry, Manager, 664 38th Street.

December—Greenville, S. C., Semi-Annual Meeting, South Carolina Automotive Trade Association.

Dec. 3-14—Brussels, Belgium, 15th Motor Show, Palais du Cinquenaire.

Dec. 6-9—Sioux Falls, S. D., Annual Convention, South Dakota Implement Dealers' Association; Exhibition of Farm Machinery Held in Connection.

Dec. 13-16—Columbus, O., Fifth Annual Convention and Exhibit, Ohio Automotive Trade Association, Memorial Hall.

Dec. 23—Detroit, Mich., Meeting, Society of Automotive Engineers.

Dec. 27-29—Chicago, Ill., Convention, American Society of Agricultural Engineers, Auditorium Hotel.

1922.

January—Chicago, Ill., Automobile Salon, Drake Hotel.

Jan. 7-13—New York City, National Automobile Show, National Automobile Chamber of Commerce, Madison Square Garden.

Jan. 9-20—New York City, First Annual Retail Dealers' Auto Equipment Show, Hotel Imperial, National Retail Merchants' & Buyers' Association; Accessories and Automobile Clothing; George T. Keen, Secretary, Hotel Imperial.

Jan. 11-14—New York City, Annual Meeting, Society of Automotive Engineers.

Jan. 14-20—Cleveland, O., Automobile Show, Cleveland Automobile Manufacturers' & Dealers' Association.

Jan. 14-20—Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Association.

Jan. 17-19—Kansas City, Mo., Convention, Western Retail Implement, Vehicle & Hardware Association; Headquarters, Coates House; Sessions in Century Theater; H. J. Hodge, Secretary, Abilene, Kan.

Jan. 17-20—Spokane, Wash., Convention, Pacific Northwest Hardware & Implement Association, Davenport Hotel; E. E. Lucas, Secretary, Hutton Building, Spokane.

Jan. 17-20—Chicago, Ill., Convention, American Road Builders' Association.

Jan. 19-25—Milwaukee, Wis., Annual Automobile Show, Milwaukee Automotive Dealers' Association, Auditorium; Passenger Cars, Trucks and Accessories; Bart J. Ruddle, Manager, 316 Brumler Building.

Jan. 23—Milwaukee, Wis., Annual Meeting, Wisconsin Automotive Dealers' Association.

Jan. 23—Montgomery, Ala., Annual Meeting, Alabama Automotive Dealers' Association; James B. Farley, Secretary, Montgomery.

Jan. 24-27—Portland, Ore., Convention, Oregon Retail Hardware & Implement Dealers' Association, Imperial Hotel; E. E. Lucas, Secretary, Hutton Building, Spokane, Wash.

Jan. 24-Feb. 3—Chicago, Ill., National Automobile Show, National Automobile Chamber of Commerce, Coliseum.

Jan. 30-Feb. 4—Minneapolis, Minn., Tractor Show.

Jan. 30-Feb. 4—Scranton, Pa., 12th Annual Passenger Car Show, Scranton Motor Trades Association, Armory; Passenger Cars, Trucks, Tractors and Accessories. Hugh B. Andrews, Manager, 411 Board of Trade Building.

February—Madison, Wis., Ninth Annual Show, Automobile Dealer Division, Association of Commerce; Passenger Cars, Trucks and Accessories; Don W. Mowry, Manager, Cartwell Building.

Feb. 3-10—Minneapolis, Minn., 15th Annual Automobile Show, Minneapolis Auto Trade Association; Passenger Cars, Trucks and Accessories; W. R. Wilmut, Manager, 709 Andrus Building, Minneapolis.

Feb. 6-9—Scranton, Pa., Annual Truck Show, Scranton Motor Trades Association, Armory; Hugh B. Andrews, Manager, 411 Board of Trade Building.

Feb. 6-11—Winnipeg, Manitoba, Canada, Second Annual Automotive Equipment Association, Board of Trade Auditorium. Secretary, W. L. Williams, New Stovel Building, Winnipeg.

Feb. 7-10—Des Moines, Ia., Convention and Exhibition, Iowa Retail Hardware Association; Exhibition in Coliseum; A. R. Sale, Secretary, Mason City, Ia.

Feb. 7-10—Grand Rapids, Mich., Convention and Exhibition, Michigan Retail Hardware Association; Karl S. Judson, Ex-

hibits Manager, 248 Morris Avenue, Grand Rapids; A. J. Scott, Secretary, Marine City, Mich.

Feb. 7-10—Lincoln, Neb., Convention, Nebraska Retail Hardware Association; George H. Dietz, Secretary, 414-417 Little Building, Lincoln.

Feb. 8-10—Milwaukee, Wis., Convention and Exhibition, Wisconsin Retail Hardware Association; P. J. Jacobs, Secretary, Stevens Point, Wis.

Feb. 9-16—Kansas City, Mo., Kansas City Motor Car Dealers' Association.

Feb. 11-18—San Francisco, Cal., Sixth Pacific Automobile Show, Motor Car Dealers' Association of San Francisco, Exposition Auditorium; Passenger Cars, Trucks, Tractors and Accessories; G. A. Wahlgreen, Manager, 215 Humboldt Bank Building.

Feb. 14-16—Chicago, Ill., Convention, Illinois Retail Hardware Association, Hotel Sherman; Leon D. Nish, Secretary, Elgin, Ill.

Feb. 14-17—Philadelphia, Pa., 21st Annual Exhibit and Convention, Pennsylvania & Atlantic Seaboard Hardware Association, Inc., Commercial Museum; Automobile Accessories, Etc.; Sharon E. Jones, Secretary, 1314 Fulton Building, Pittsburgh.

Feb. 14-17—St. Paul, Minn., Convention, Minnesota Retail Hardware Association; H. O. Roberts, Secretary, 1030 Metropolitan Life Building, Minneapolis.

Feb. 20-25—Duluth, Minn., Seventh Annual Show, Duluth Auto Trade Association, Duluth Army Building; Passenger Cars, Trucks, Tractors and Accessories.

Feb. 20-25—Louisville, Ky., 14th Annual Automobile Show, Jefferson County Armory; Passenger Cars and Accessories; George T. Holmes, Inter-Southern Building.

Feb. 21-24—Mitchell, S. D., Convention and Exhibit, South Dakota Retail Hardware Association; H. O. Roberts, Secretary, 1030 Metropolitan Life Building, Minneapolis, Minn.

Feb. 24—Detroit, Mich., Meeting Society of Automotive Engineers.

Feb. 26-March 3—Des Moines, Ia., Winter Automobile Show.

Feb. 27-March 4—Atlanta, Ga., Second Annual Great Southern Automobile Show, Atlanta Automobile Association, Auditorium Armory; Passenger Cars, Trucks and Accessories; Virgil W. Shepard, Manager, 305 Connolly Building.

Feb. 27-March 10—London and Birmingham, England, British Industries Fair.

March—Santiago, Chili, Annual Automobile Show.

March 4-11—Brooklyn, N. Y., 11th Annual Show, Brooklyn Motor Vehicle Dealers' Association.

March 11-18—Newark, N. J., Automobile Show, Newark Automobile Dealers' Association.

March 11-18—Boston Show, Mechanics' Building.

March 24—Detroit, Mich., Meeting, Society of Automotive Engineers.

April 28—Detroit, Mich., Meeting, Society of Automotive Engineers.

May—Quito, Ecuador, Agricultural Exposition, Celebrating Centenary of Ecuador, Including Automotive Section.

May 26—Detroit, Mich., Meeting, Society of Automotive Engineers.

September—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with Brazilian Centenary Associao Automobilista Brasileira.

MODEL SERVICE STATION FOR THE COMMERCIAL VEHICLE

One-Story Fire-Proof Structure Complete with Office, Storage Space, Machine and Repair Shops.

(Designed by the Architectural Department of the Automobile Journal Publishing Co.)

THE accompanying plans offer a suggestion to intending builders for an ideal service station to be used by the up-to-date, progressive service station owner in caring for the general run of repairs such as would naturally be brought to a service station in a large town or small city.

The building should be conveniently arranged, close to a near-by main travelled thoroughfare, and it is advisable, if possible, to locate such a building several feet back from the street curbing to allow sufficient space in front for temporary repairs, although the plan shows the building flush with the side walk as shown in Figure 1.

The building measures 100 feet deep by 130 feet wide and fronts on the street for 130 feet. The office is centrally located, between the two large entrances, one at either side, through which the vehicles enter the station from the street. The office is equipped with a street door and also a door opening into the station. The right-hand side of the station is given over to passenger cars while the left gives space for motor trucks.

The floor of the station is of cement construction sloping to drains a short distance in from the main entrances, which are connected to the city sewerage system or to a catch basin in the yard. A wash stand is located at the right rear corner of the station, also of cement construction, and fitted with a drain connected to the sewerage system and equipped with sediment and oil separating tanks, which separate the oil and grease from the liquids before the latter pass into the sewer. Provision is made for cleaning the tanks at intervals by removing the grating and dipping out the sediment with a long-handled dipper.

The roof is supported on steel girders on iron posts spaced equidistant throughout the station. These do not, however, interfere with the storing of cars or trucks as sufficient space is allowed between posts for backing the vehicles.

Adjoining the lavatory is the oil room, separated from it by a fire-proof wall provided with a single door opening into the main floor of the station. All oils and grease supplies are stored in this room, thus providing a minimum of fire

danger throughout the building.

The stock room adjoins the oil room, being separated from it also by a fire-proof wall, and sufficient bins and shelves are provided for carrying all necessary stock and small tools needed by the repairer in the repair and machine shops. Two doors open from this room, one to the main part of the station and the second into the repair shop.

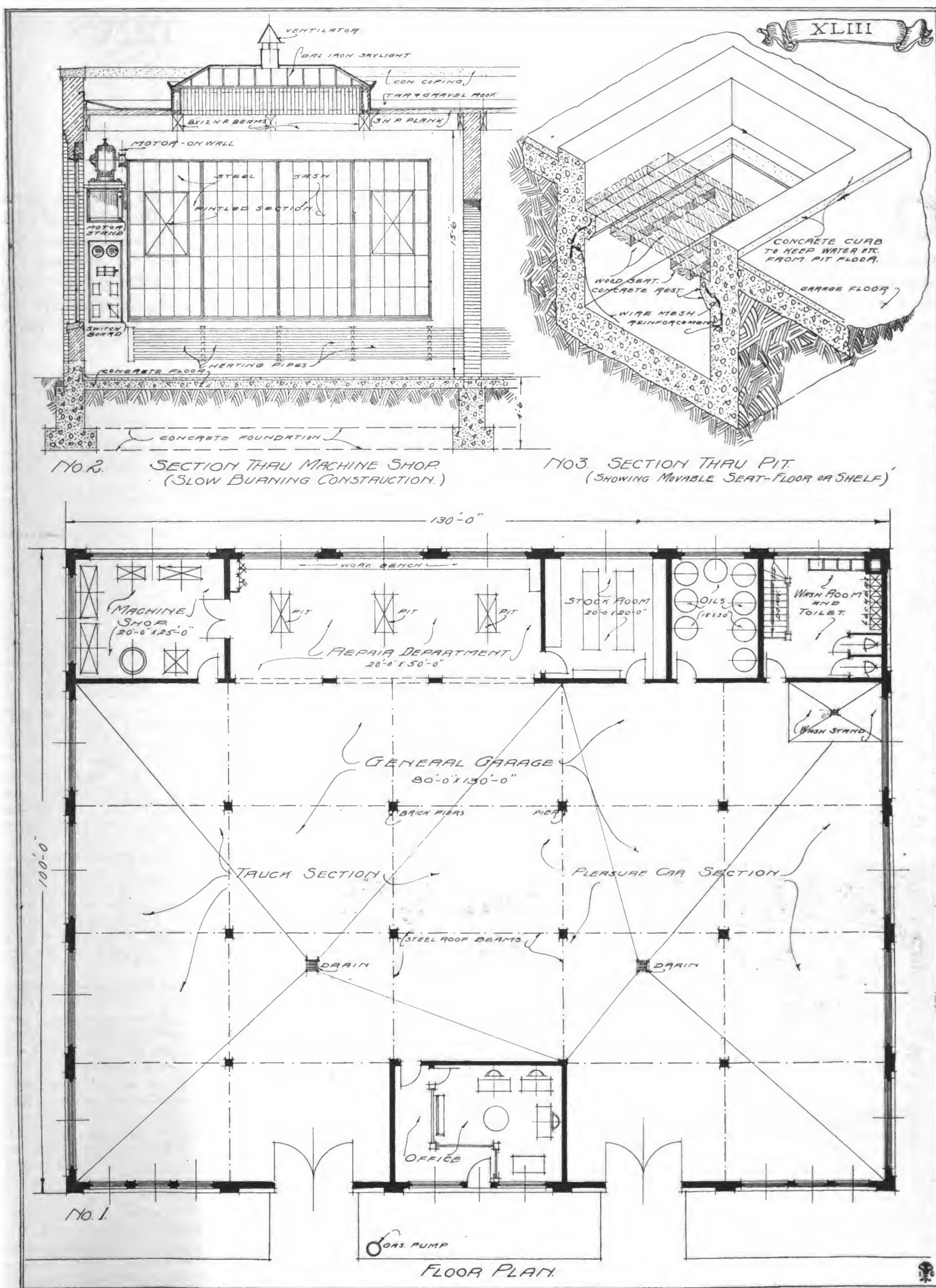
The repair shop is at the left of the stock room, separated from it by a fire-proof wall. Three pits are provided, so that work may be under way on three vehicles at a time without confusion. Ample room is given around the vehicles for the repairers, while the work bench is conveniently located in front of the pits, sufficient light being obtained from large windows over the bench. Provision is made for large sliding doors opening into the station, which may be closed while repair work is under way.

The machine shop occupies space in the left-hand corner of the station, is 20 by 25 feet in size and is equipped with forge, lathe, milling machine, power cut-off saw and other machines that may suggest themselves to the intending builder. Power for the machines is obtained from an alternating current motor located on a stand in the left corner of the room connected to the city power mains, with control panel below. Two door openings are provided to the machine shop, a large opening into the repair department of sufficient size to admit a car or truck and also an opening of smaller size into the service station. The walls are of fire-proof construction, while additional light is obtained from a sky light fitted with ventilator directly overhead.

Figure 2 illustrates a section through the machine shop, showing the foundation construction of cement, with brick above and coping of either brick or stucco cement as desired.

The cross timbers of the roof are eight by 12-inch hard pine covered with three-inch hard pine plank, tongued and grooved. The weather covering is composed of several thicknesses of tar paper covered with tar and gravel.

Figure 3 shows the construction of the pits, the cross section illustrating the method of reinforcing the ledges supporting the slatted wooden seat used by the repairer.



New Dorris Shows Few Changes

Latest Offering of Well-Known Maker Has Many Refinements While Still Retaining Original Design—Makes Use of Special Valve-in-Head Engine.

ONE of the greatest contributing factors to the success of the Dorris truck is stated to be the perfected valve-in-head engine of special design, which follows the same general design of the first Dorris engine constructed by the company. This engine has been refined, through advanced engineering methods, and has been brought up-to-date to its present state of efficiency, and proves a power plant unequalled for economy of operation and maintenance, giving unlimited, continuous service and owner satisfaction. The Dorris K-4, two-ton truck chassis and the K-7 3½-ton truck chassis are powered by a special valve-in-head engine of Dorris design which supplies sufficient power to handle the trucks and their loads under practically any conditions which may arise in haulage service.

DORRIS power plants consist of four-cycle, four-cylinder, I-head, vertical engines fully enclosed having a bore of 4¼ inches and stroke of 5½ inches, developing under N. A. C. C. rating 28.9 horsepower or 38 actual horsepower at 1090 revolutions a minute.

Five main journals are used to support the crank shaft, which is positioned in webs cast integral with the upper half of the engine crank case. The cam shaft also has five bearings, which amply support it and prevent whipping or vibration.

The crank case, cast from Lynite aluminum, is divided into two sections, upper and lower, the upper section consisting of a forward extension cast integral, which forms the timing gear set, while the rear extension, cast integral, forms the standard S. A. E. bell housing of the fly wheel. Support arms cast integral with the upper section form engine supports for the three-point suspension. The lower half of the fly wheel housing is separable and is bolted to the upper half by means of steel alloy stud bolts.

The lower half of the crank case contains the oil sump and oil reservoir,

which supplies the engine with lubrication by means of a pressure pump driven from the rear end of the cam shaft.

The crank shaft is drilled to deliver oil under pressure to the crank pin bearings, also providing positive lubrication to all other moving parts of the engine.

The valve mechanism and rocker arms are fully enclosed, preventing the abrasive action of dust causing undue wear to the parts, while they are lubricated by a mist or fog supplied from the engine crank case. The engine head is separable, fitted with a breather that allows the crank case pressure, which forces the lubricant to the valve mechanism, to escape into the air after performing its work. The removable head facilitates the cleaning off of carbon and the inspection of the valves and pistons.

The governor, which is used on Dorris trucks is of Dorris design, of the fly ball type, built integral with the engine, enclosed in a large cam gear and is adjustable, sealable and, it is claimed, trouble-proof. Ignition is supplied by a Bosch DU-4 straight high-tension magneto, driven through a flexible coupling from the end of the generator armature, which

in turn is actuated from the timing gear set. All high-tension wires are carried in a metal conduit which amply protects them from dirt and oil.

Provision is made in the upper crank case housing for the mounting of a gear driven generator which supplies current for the storage battery for lights and starting. The Westinghouse system is used in connection with the Westinghouse starting equipment, a Willard six-volt, 130 ampere-hour battery and Klaxon horn.

The carburetor is an improved Model M-2 Stromberg easily adjusted for power and atmospheric conditions. The carburetor is equipped with a U-tube, which insures ample fuel for acceleration and power, although the running mixture is set to maintain maximum economy. A dash control with hot air horn assures satisfactory cold weather operation.

Both the intake and exhaust manifolds are united to form a distinctive superheater of Dorris design. The incoming gases are drawn directly against this superheater, giving perfect vaporization with maximum economy and quick engine efficiency.

The clutch is of the dry-plate multiple-disc type, consisting of seven members, faced with a special friction material, providing an exceptionally smooth, easy clutch action, yet a positive application of power. The unit is assembled with the engine and is enclosed by the fly wheel housing.

The transmission is mounted amidship to provide greater accessibility. Four speeds forward and one reverse are provided, which amply meets all power transmission conditions. The gears are made from 3½ per cent. nickel steel, completely enclosed in an oil-tight case, mounted on three-point suspension, which sufficiently protects it from all unusual strains and preserves perfect alignment. A power take-off is provided at the side by means of which attachments, such as a winch, or drum, may be operated, or for mechanical hoist attachments.

The propeller shaft is in two sections, fitted with Spicer universal joints on each end which cares for the angularity of drive. The rear shaft is extra large to safely transmit the additional leverage obtained with the four-speed transmission.

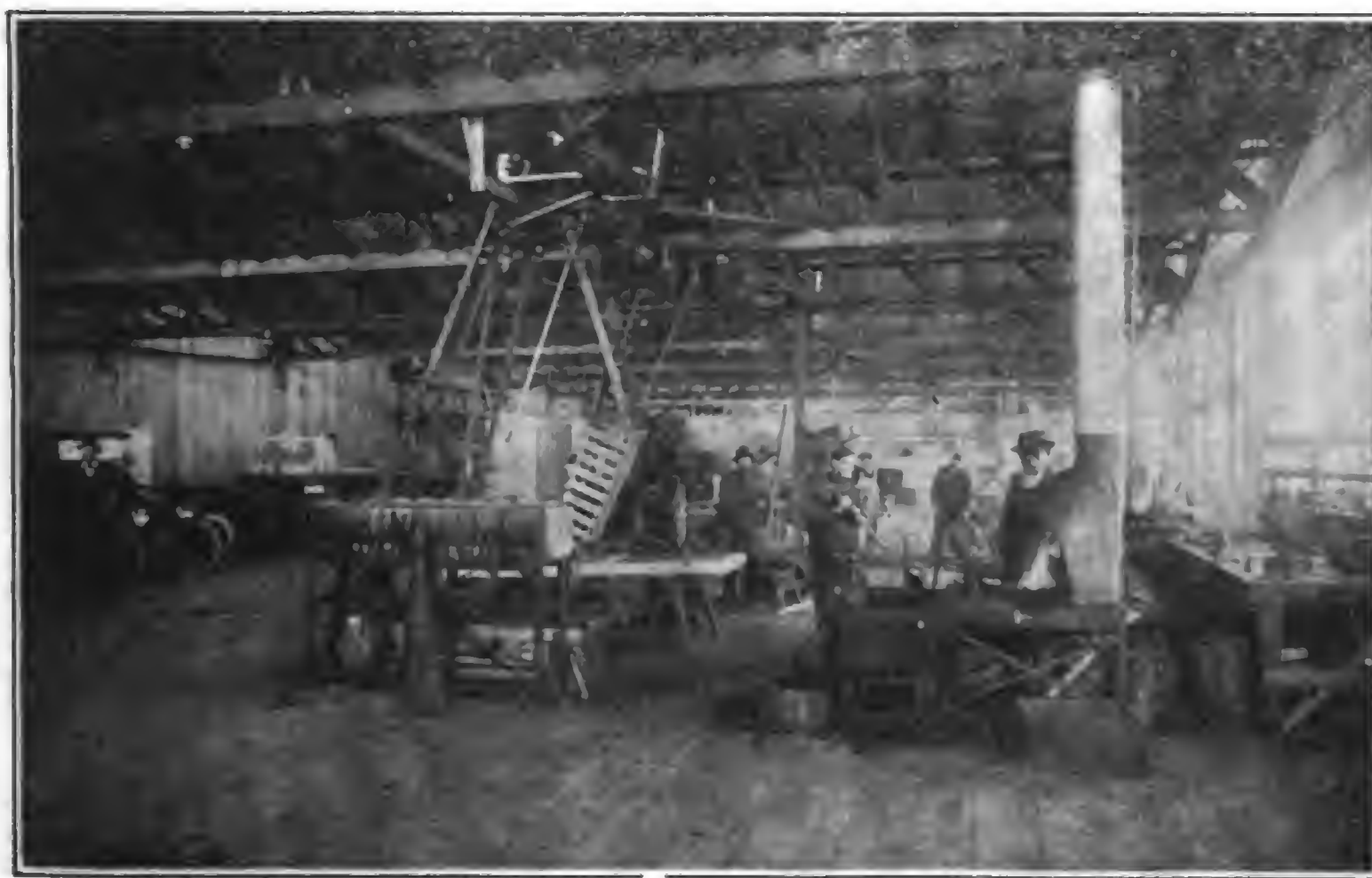


Dorris Trucks Are Used Extensively in Delivering Dairy Products, Their Power and Economy in Operation Recommending Them for This Particular Service.

Mammoth Factory of S. S. Albright

"Day-Light" Plant of Enterprising Concern Is One of Sacramento's Show Features—Attracts Attention of Visitors by Its Up-to-Date Equipment and Methods.

ADEQUATE light and ventilation are two of the most important requirements of the modern work shop, whether it be manufacturing plant, sales room, repair shop, garage or service station. One of the "show" features that are pointed out to the visitor to Sacramento, Cal., and which is of particular interest to automobile tourists, is the mammoth factory of the S. S. Albright Co., at 13th and U streets. This is known as the "Day-Light" plant and covers a floor space of more than 30,000 square feet, all on a single floor. The Albright service covers bus, truck and passenger car body building; special designing, painting and trimming; fender, radiator and wheel work; blacksmithing and spring making; acetylene welding and all classes of automobile engine repairing and overhauling.



Portion of Blacksmith Shop and Body Building Department of S. S. Albright Co.—Here Skilled Men and Modern Equipment Combine to Turn Out High-Grade Automobile Work.

VISITORS to the S. S. Albright Co.'s "day-light" plant are invariably impressed with two predominating features. One of these is the effective application of the saw-tooth form of roof construction, which gives a super-abundance of natural light by which the mechanics work in every department. This not only greatly reduces the expense for lighting, thus cutting down the overhead, but results in more efficient workmanship, because it is an indisputable fact that anyone can work faster and better in a well-lighted and well-ventilated room than in a dark and dingy shop where he must constantly strain his eyes.

The second outstanding feature that impresses itself on the visitor is that as

every car moves through the various departments of the shop, the work progresses by a scientific and thoroughly tried out system towards completion as it nears the point of exit, thus avoiding the duplication of energy and the waste of time where a job is run back and forth to various departments arranged helter-skelter all over the factory.

All material is kept in overhead stock rooms where it is easily obtained, but is always out of the way of the workmen, and valuable floor space is saved.

Starting from the office the first department that is entered is stock room No. 1, where bolts, screws, tires, springs, wheels, paints, varnishes, oils, etc., are kept in systematic order. Near by, on a

mezzanine floor, is stock room No. 2, where the spring steel, flat, round and octagon, is kept in neat racks.

Next the visitor enters the main blacksmith shop, where the spring repairing and building department is seen. The spring furnace is heated by gas, which gives and holds an even temperature at any desired degree. The leaves are tapered by machinery, instead of by hand, this method being quicker, cheaper and superior in every way. After being formed the springs are oil-tempered in a special vat, surrounded by flowing water which keeps the oil at an even temperature. One feature here is a gas meter on each machine, by which the exact amount of fuel used can be quickly and easily computed, an important point in figuring the cost of the work. The tire setting block is built into the floor, and there is a hydraulic press of the latest type, weighing six tons, with a pressing capacity of 250 tons, used for pressing on truck tires.

Adjoining this department and conveniently located is the body building shop, where there is a complete equipment of wood-working machinery. Adjoining it, on the mezzanine floor, is a stock room where all the materials for wheel building are kept. A year's supply of choice lumber is carried in stock, thus assuring thoroughly seasoned material at all times.

All cars that are in the paint shop are placed on trucks so that they may be easily moved from one department to another. Special revolving jacks are used,



Day-Light Plant of S. S. Albright Co., Sacramento, Cal., Covering Floor Space of More Than 30,000 Square Feet.

on which an entire wheel can be painted while the painter stands in one position.

The varnishing rooms come next. In the under-coating varnish rooms there are three ovens, gas heated, which are regulated by instruments to the desired degree of heat.

The car next goes into the finishing room, where the striping, lettering and finishing are done. This room contains four baking ovens. These rooms are dust-proof and no one is allowed to enter except the workmen.

Next is the trimming department, where are made or repaired all tops, seat coverings, etc. Here are sewing machines operated by electricity, which insure accurate work.

Each department of the S. S. Albright business is supervised by men who have specialized for years in the particular branch of work they perform, and this fact, together with insistence that only the best grade of material is used in all construction and repair work, enables it to cater with satisfaction and with the most reliable guarantee to the most exacting clientele.

Service Is Rendered Efficient by System.

The high reputation for turning out all work promptly and well finished at a fair price has been achieved by the Albright Co. only by a thoroughly workable and comprehensive system of records, covering all items of stock used, time consumed, etc. Each individual job is booked when received at the shop, a careful examination is made and all items of repairs needed are entered on a proper card or tag and an estimate of cost and time of delivery is given whenever possible. It is the plan of the company to

Paint Shop of S. S. Albright Co., Showing Saw-Tooth Construction of Roof Cars Are Placed on Trucks or Racks to Facilitate the Handling of the Work.



be conservative in these estimates, especially as to delivery date, in order that there may be no disappointments on the part of customers. Suitable blank forms accompany the jobs through the shop on which is entered every item of stock or material used, and the time spent in each department is accurately registered and when the job is finished and the record card comes back to the office it is an easy matter for the bookkeeper to figure up all items of cost and to make out the bills therefrom promptly and accurately.

The customer receives, when he leaves his car, a duplicate slip covering such items as principal repairs, estimated cost and date of delivery, so there can be no misunderstanding. The bookkeeper has at hand and can supply an itemized statement of all operations on

any particular job and this is of especial service in case of any dissatisfaction.

A comprehensive shop record is also kept covering each workman's time, the amount and character of work performed, material used, etc., and this is made to cover new work as well as repairs. By a stock requisition system the amount of stock on hand is checked at all times and it operates as a perpetual inventory.

These records serve several distinct purposes: A comparison can be kept of the estimated and actual cost of performing any particular job, so that the manager will be in a position to modify, if necessary, charges on any work which was under or over-estimated. The bookkeeper can easily draw up an exact profit and loss statement of operation for any given period and with a minimum of time and labor.

Inspect Truck Carefully Before Attempting Long Trips

BEFORE attempting long trips with the motor truck the driver should make it a practise to go over the machine and check up carefully the various units that are used in operation. Time spent in this manner will be to the driver's advantage and will often save delays on the road.

The brakes should be examined to see that they grip properly when the brake pedal is depressed or the emergency brake is applied. Speed up the car with the accelerator and note if the brakes stop the car on dry going within a reasonable distance. Stop the truck on a steep hill and apply the emergency brake; note if it holds the truck under these conditions. Take into consideration that a load will be carried later and if the emergency does not hold sufficiently tight trouble may occur if the brake is not in good working condition. Good working brakes prevent accidents and save repair bills.

Test the fan often to see that it is driving properly; it should be just tight enough to allow the fan to be turned by hand and still not slip when being driven by the engine.

Check over the ammeter. This little instrument tells the driver what is occurring in the electrical system, especially the storage battery, and should show zero when the engine is stopped and the lights

out. If discharge is indicated under these conditions, there is a short circuit that should be corrected, else the battery will run down in a short time.

Do not run the truck front wheel hard against the curbing. The weight of the

SHOULD CARRY FIRE EXTINGUISHER.

EVERY truck should carry a fire extinguisher. It may never be needed, but if it is it will probably save considerable money. Fire insurance companies often make easier rates if it is known that a fire extinguisher is carried, as the damage in case of fire is greatly lessened.

truck, combined with its momentum, will cause the tie rod to bend, forcing the front wheels out of alignment and wearing the front tires. Check the wheel alignment often to prevent excessive tire wear and to gain the utmost tire mileage from the front tires.

Knocks in the engine are often due to overheating and will be more pronounced when going up hill, but may often be noticed on a level road. Overheating, if allowed to continue long enough, will indicate itself by steaming from the radiator through the water overflow. Refilling the radiator after the engine has cooled will usually remedy the trouble. Sometimes the trouble is caused by a slipping fan belt or clogged cooling system. In the case of the former tighten the fan belt and in the latter clean the cooling system with washing soda and hot water, allowing the engine to run to keep the water hot. This loosens the sediment and rust; the system should afterwards be drained and rinsed out several times with clean water before refilling.

It often happens that after new piston rings have been installed for the purpose of preventing oil leakage, the condition will continue. Either the work was not properly done at the time they were put in or sufficient time has not elapsed for them to fit themselves to the cylinder walls. Rings as now made fit themselves to the walls within a few hundred miles and, with a correct grade of oil should seal the space between the walls and the ring. Lapping in the rings when installing shortens the time of fitting and restores the compression quickly and prevents the oil from leaking.

New Home of General Motors

MAMMOTH BUILDING, LARGEST OF ITS KIND IN THE WORLD, CONTAINS MANY MODERN INNOVATIONS—HAS FOUR MILES OF CORRIDOR, 1700 OFFICES, 4726 WINDOWS AND 6884 ELECTRIC LIGHTING FIXTURES.

THE General Motors building, the largest office building of its kind in the world, is 15 stories in height, of steel frame construction, with first quality Bedford limestone facing. The research laboratory, adjacent to the office building on the south, is five stories in height, of reinforced concrete construction, with first quality Bedford limestone facing.

These two buildings have outside dimensions of 504 feet east and west by 322 feet north and south, and are connected to a 2000 horsepower power house on a railroad siding one block away by a reinforced concrete tunnel eight feet high by 11 feet wide inside, with electric tram service. A depressed drive 504 feet long by 18.33 feet wide on the elevation of the basement floor extends from Cass to Second avenues, and divides the basement of the office building from the basement of the laboratory.

THE gross floor area inside of the laboratory walls is 195,331 square feet, and in the office building 1,125,871 square feet, giving a total of 1,321,202 square feet. The total rentable area in the two buildings is 1,054,685 square feet.

The office building will contain two swimming pools, one for men and one for women, each 25 feet by 75 feet; a gymnasium 88 feet by 60 feet; 12 bowling alleys; a 31-table billiard room; barber shop; mail room, 97 feet by 52 feet; stationary supply storage, 116 feet by 80 feet; utility rooms with equipment and locker rooms. The mail room is connected to the upper floors by a bank of 28 pneumatic tubes and one independent supply and one independent return to each floor.

The first or main floor will include four 10,000 square foot and four 5000 square foot automobile show rooms; an auditorium accommodating 1500 people; a bank, trust company and the usual lobby shops. The second to the 13th floors, inclusive, will be devoted to general office space. On the 14th floor will be the executive offices, executive living suites, the executive general dining room and private dining rooms, lounge and private barber shop. The 15th floor will comprise two dining rooms, one for men and one for women, with cafeteria service; a ladies' rest room; a men's lounge and games room; hospital; doctor; dentist and nurses' office; employees' dance hall. The 16th floor will contain the valet quarters and pent house.

The office building is served by 24 high-

speed passenger elevators and two freight elevators. The laboratory building has three high-speed passenger elevators and two freight elevators. The capacity of

mately four miles of corridors, 4749 radiators, 4726 windows and 6884 electric lighting fixtures. The laboratory will contain 251 radiators, 422 windows and



This Mammoth Office Building, Largest of Its Kind in the World, Is 15 Stories in Height and Positively Fire Proof.

the entire building will be for about 6000 tenants, with about 1700 typical offices, each 20 feet by 15 feet.

The office building will contain approxi-

1032 electric lighting fixtures. There are 15,000 tons of steel in the office building frame, and 450,000 cubic feet of Bedford limestone on the two buildings.

(Continued from Page 574.)

trucks on runs to Lorain, 28 miles west. And it went through at times when others failed. In fact, dealing as we do in a commodity such as pie, if there is one thing we must insist on, it is that our delivery trucks 'get there' regardless of circumstances."

"But Whites have given us security in the delivery end. Just follow me and I'll show you another side of the business

that gives us something to think about." And Mr. Terrell led the way up a flight of stairs, opening into a room where stood rows of barrels. Some contained raspberries, some huckleberries, some blackberries, some cherries.

"Fresh the year around," explained Mr. Terrell, indicating with a gesture that he referred to the berries. "As for apples, peaches and the like, we buy up entire orchards in the proper season. Our fruit

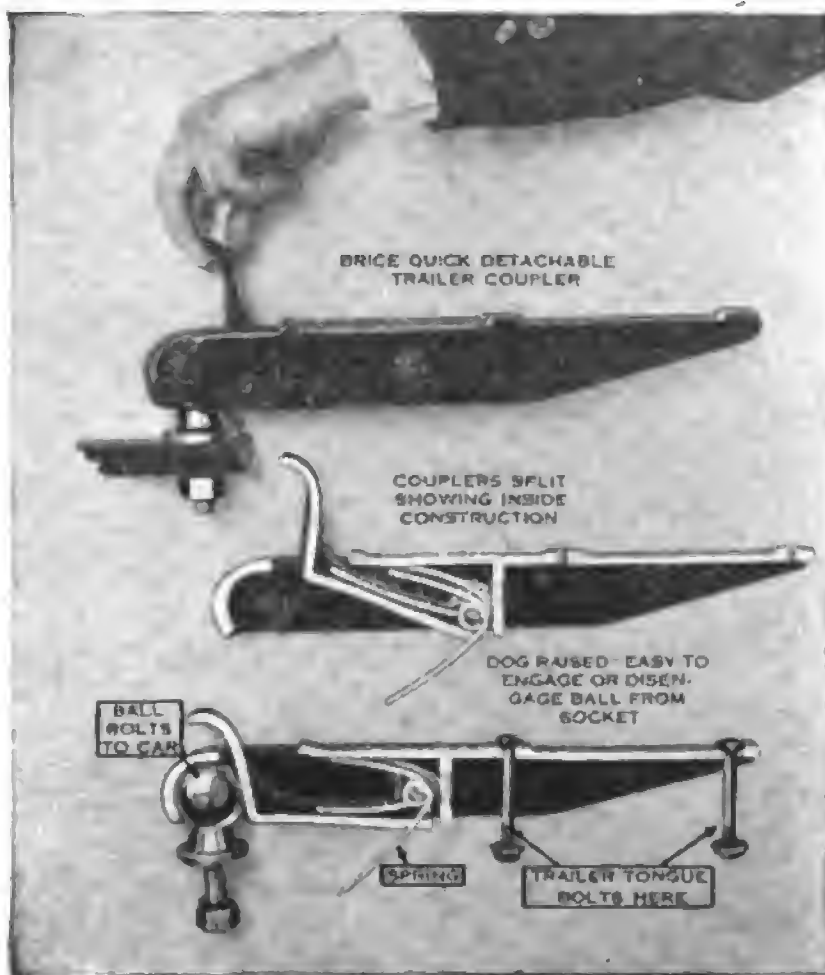
comes to the bakery from cold storage daily as we need it. Raisins we buy by the car load. Sugar, well we use better than two tons a day and the same goes for lard, so you can see what quantities we must buy in. But these are just a few ingredients that find their way into the 90 tons of pie that leave this bakery every week."

Ninety tons of pie! Get your imagination under that load.

New Motor Truck Accessories

The **Brice Automatic Coupler** is a ball-and-socket device, which has been designed along correct mechanical principles, especially for coupling light trailers, or boat trailers, to light trucks or automobiles. A lever on the top of the coupler bar locks the coupler in position for use, while raising the lever unlocks the coupler when not in use.

It is claimed that the coupler will not rattle as the locking dog is held in position with a spring which prevents the

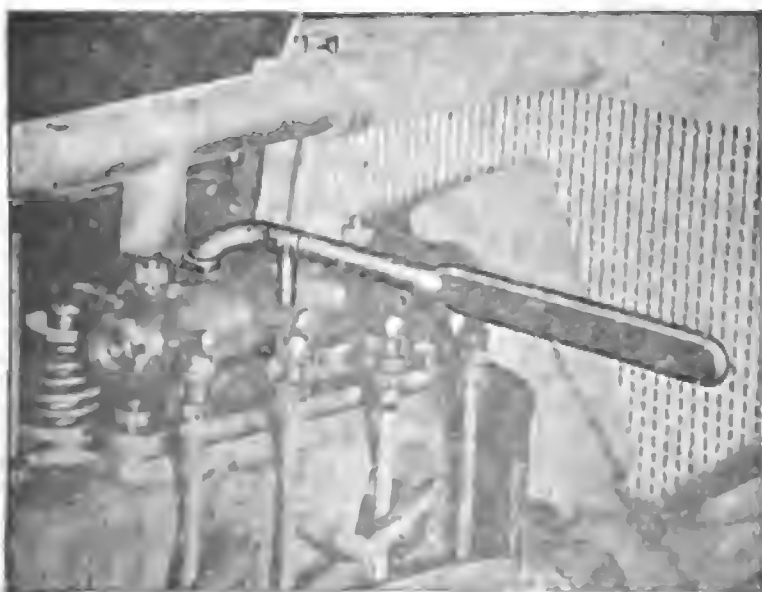


side movement of the locking device. The coupler is quickly and easily attached in a few minutes time by anyone handy with tools and becomes a part of the towing truck.

Manufactured by the **Brice Automatic Coupler Co.**, 1408-10 Hennepin Avenue, Minneapolis, Minn.

The **J. & B. Rocker Arm Lifter** is designed to be used in conjunction with the valve cage remover for the purpose of lifting the rocker arm clear from the ball end of the push rod, allowing the push rod to be sprung out of place, and the rocker arm to be revolved about its axis away from the valve stem, giving free access to the valve spring cage.

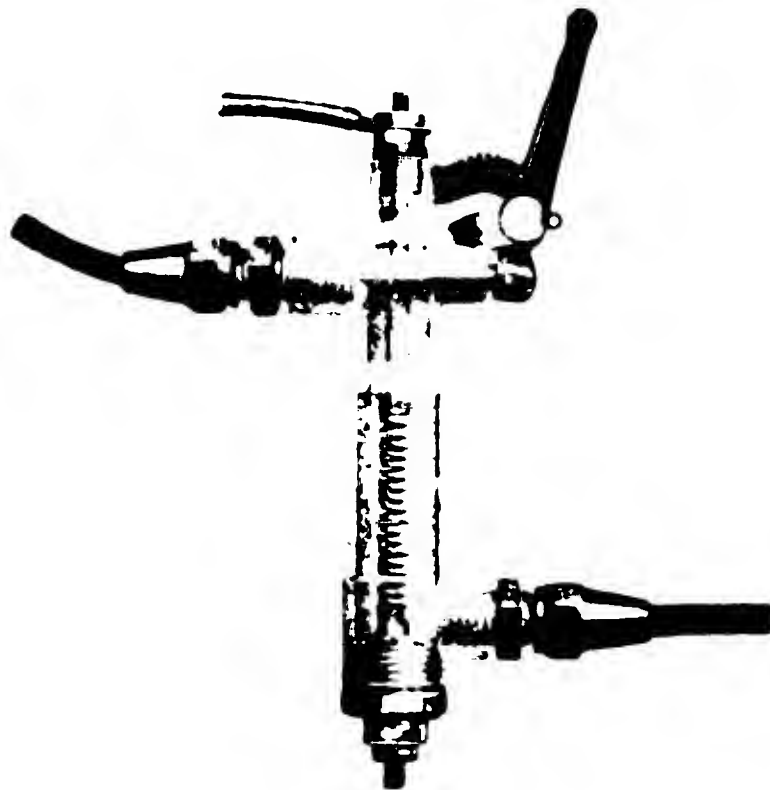
A wheel puller and bushing remover are also manufactured by the same company, which offer two useful devices for the re-



moval of stubborn wheels or bushings. They are simple in construction, easily attached for use and do their work with ease.

Manufactured by the **J. & B. Manufacturing Co.**, Pittsfield, Mass. Retail prices: **Rocker Arm Lifter**, \$2.50; **Valve Cage Remover**, \$5; **Wheel Puller**, \$5; **Bushing Remover**, \$1 each.

The **New Master Electric Primer** has been changed somewhat in design from former models. This primer is an electrically heated vaporizer, causing instantaneous starting of the engine regardless of weather conditions or the grade of gasoline used. Acting as an auxiliary car-



buretor, the primer draws gasoline direct from the carburetor, heats it to a dry vapor by drawing it over a red-hot electric coil and turns the gas into the intake manifold, causing the engine to start quickly without the loss of fuel due to poor vaporization.

Manufactured by the **Master Primer Co.**, 130 Larned Street, East, Detroit, Mich. Price, \$10.

The **Diamond Steel Roller Drive Chains** for motor trucks, industrial drives, bicycles, motorcycles, etc., offer the trade a positive power transmission having accurate control with no possibility of slippage. They efficiently transmit power, it



is claimed, under favorable conditions as high as 98 per cent. All shock absorbing strains are taken up in the chains and their long life makes for economy and uninterrupted service.

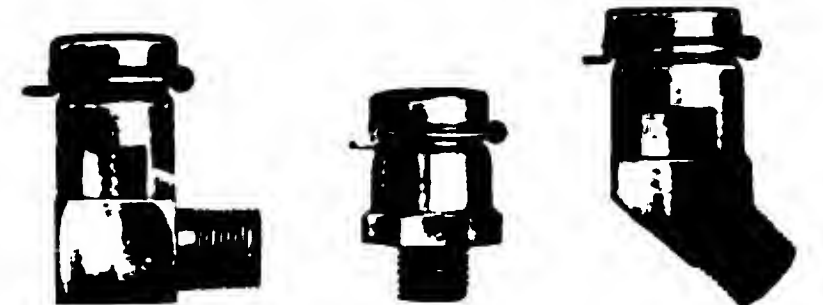
Manufactured by the **Diamond Chain and Manufacturing Co.**, Indianapolis, Ind.

The **Empress High-Pressure Lubricating System** is adapted to practically all motor trucks and passenger cars with a special equipment for Ford cars and trucks. The device consists of a high-pressure cylin-



der containing the lubricant, which is operated by hand, and special nipples which are screwed into the various grease cup openings on the chassis of the truck or car. The grease is forced through the nipple at the end of the gun into those on the chassis bearings with sufficient pressure to force out all the old oil and dirt, supplying fresh lubricant for the bearings. The system is low in cost and easily in-

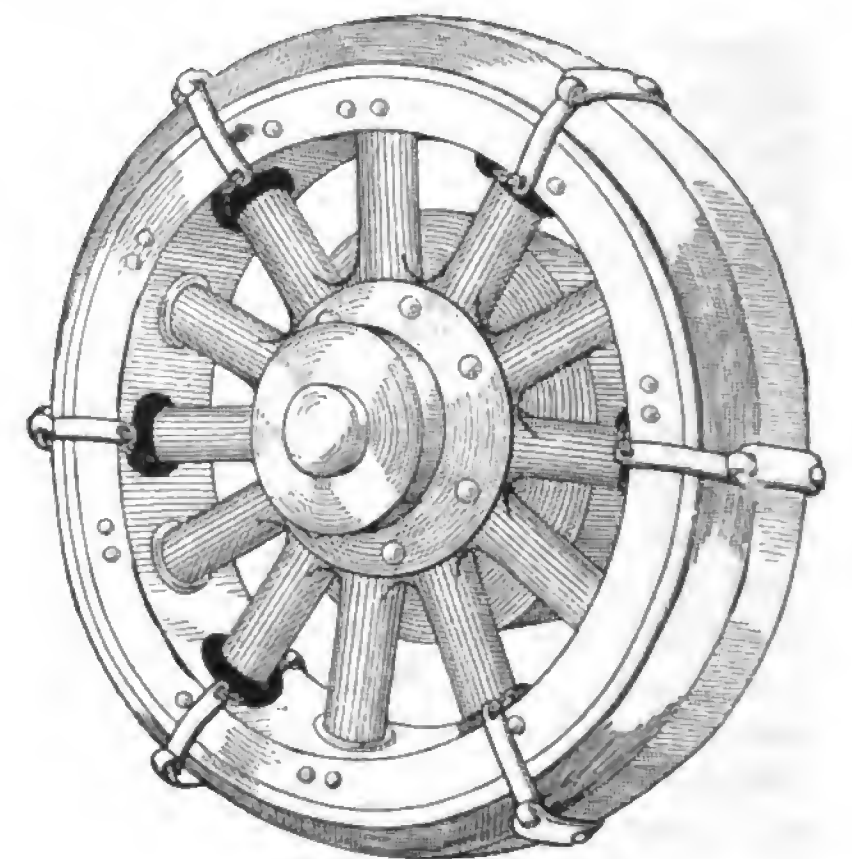
stalled by anyone in a few minutes' time by simply removing the old nipples or compression grease cups and screwing in



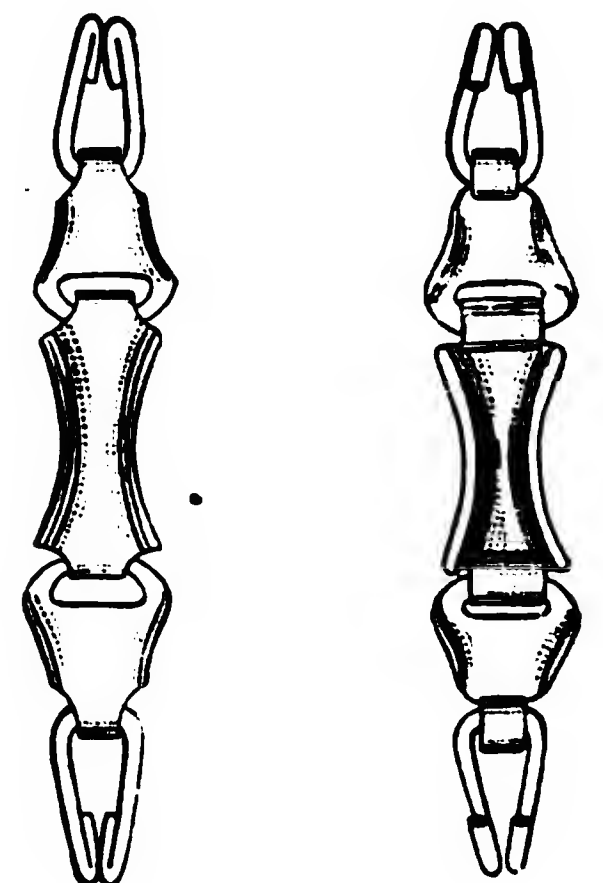
those which come with the system. Covers fit over the tops of the nipples, preventing the entrance of dust or grit.

Manufactured by the **Bowen Products Corporation**, Auburn, N. Y.

Easyon and Double-Grip Tire Chains are a new and improved type of traction chain which have special features which recommend their use for both pneumatic and solid tires on motor trucks. The cross



members resting on the tread of the tire have a rounded smooth surface adjacent to the tire to prevent injury. The chains vary in width from one to two inches and are comparatively thin. On pavements or smooth surfaces where there is no tendency for the wheels to slip the chains lie flat and prevent bumping. When slipping

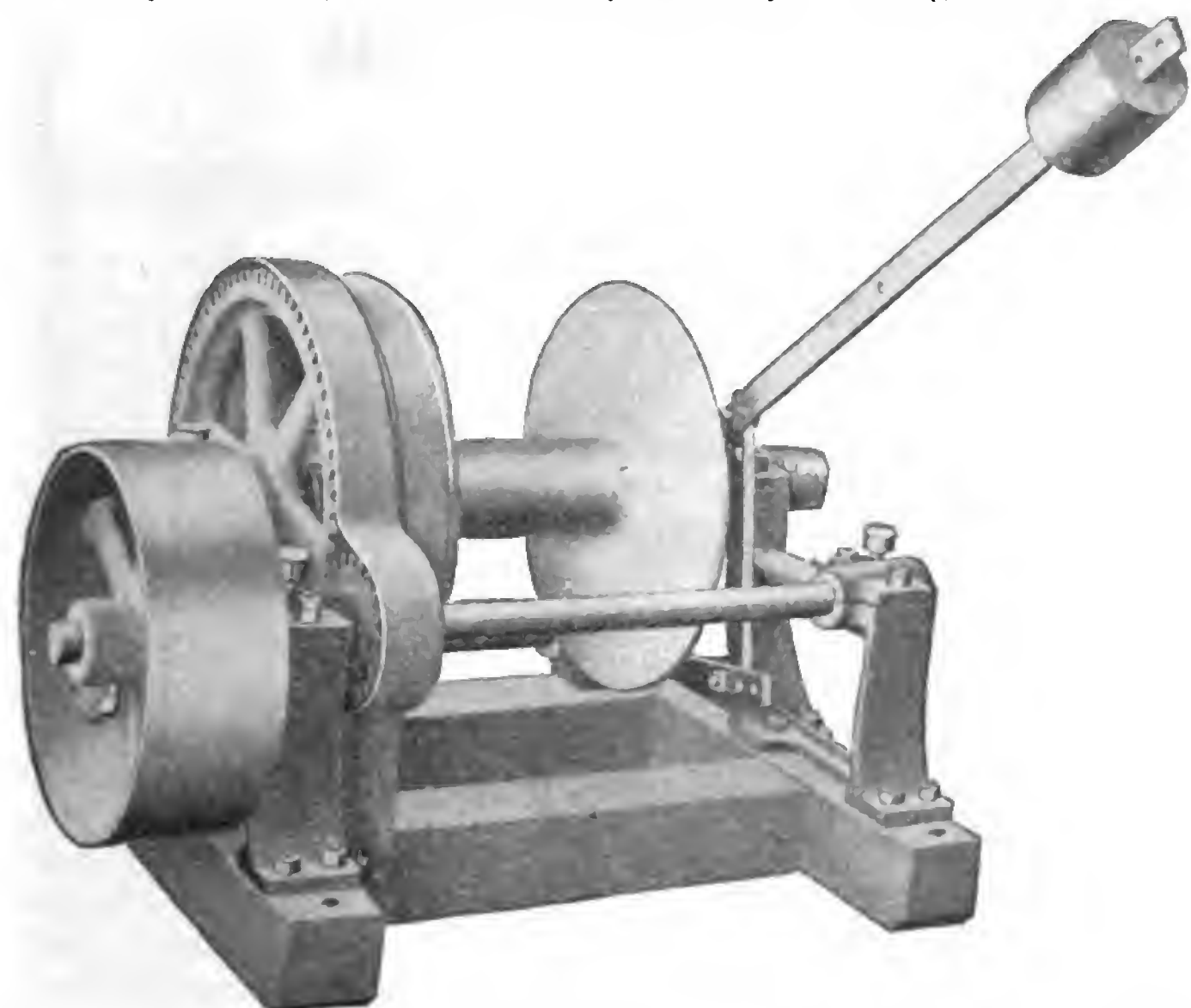


starts, however, the pull on the rear edge of the cross member tips up the front edge, causing it to dig in and take a very strong hold, preventing further slipping and supplying traction on slippery road surfaces.

The Easyon chains are fastened to the spokes with leather-covered retainers. Manufactured by the **Woodworth Specialties Co.**, Binghamton, N. Y.

O. K. Hoists are operated by outside power or by a gasoline engine mounted in a unit with the hoist. They are used largely for industrial purposes and on farms performing work formerly done by

Simplicity and ease of operation are two of the features which the company mentions. The O. K. hoist is unusually simple in construction, offering very little that can get out of order, at the same time



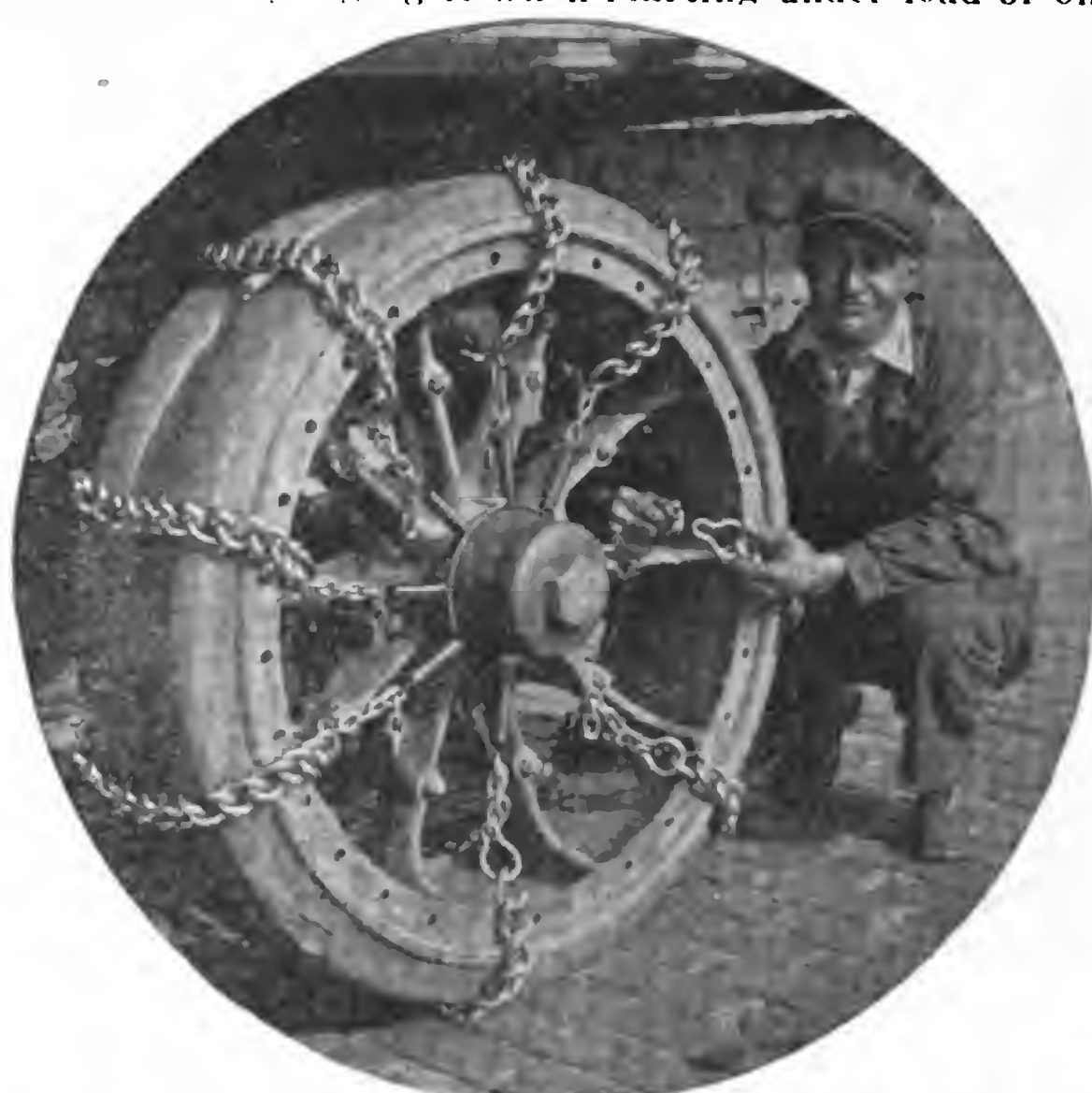
hand. Road and building contractors find them handy for loading or unloading heavy material, while farmers use them in unloading hay, lifting and other heavy work. The power may be taken from the tractor engine or from a stationary gas engine, while the control of the hoist is provided through special ropes which the farmer handles from the top of the load when unloading hay from a wagon body.

being easy to operate with the power furnished from the farm tractor or stationary engine.

Manufactured by the O. K. Clutch & Machinery Co., Columbia, Pa.

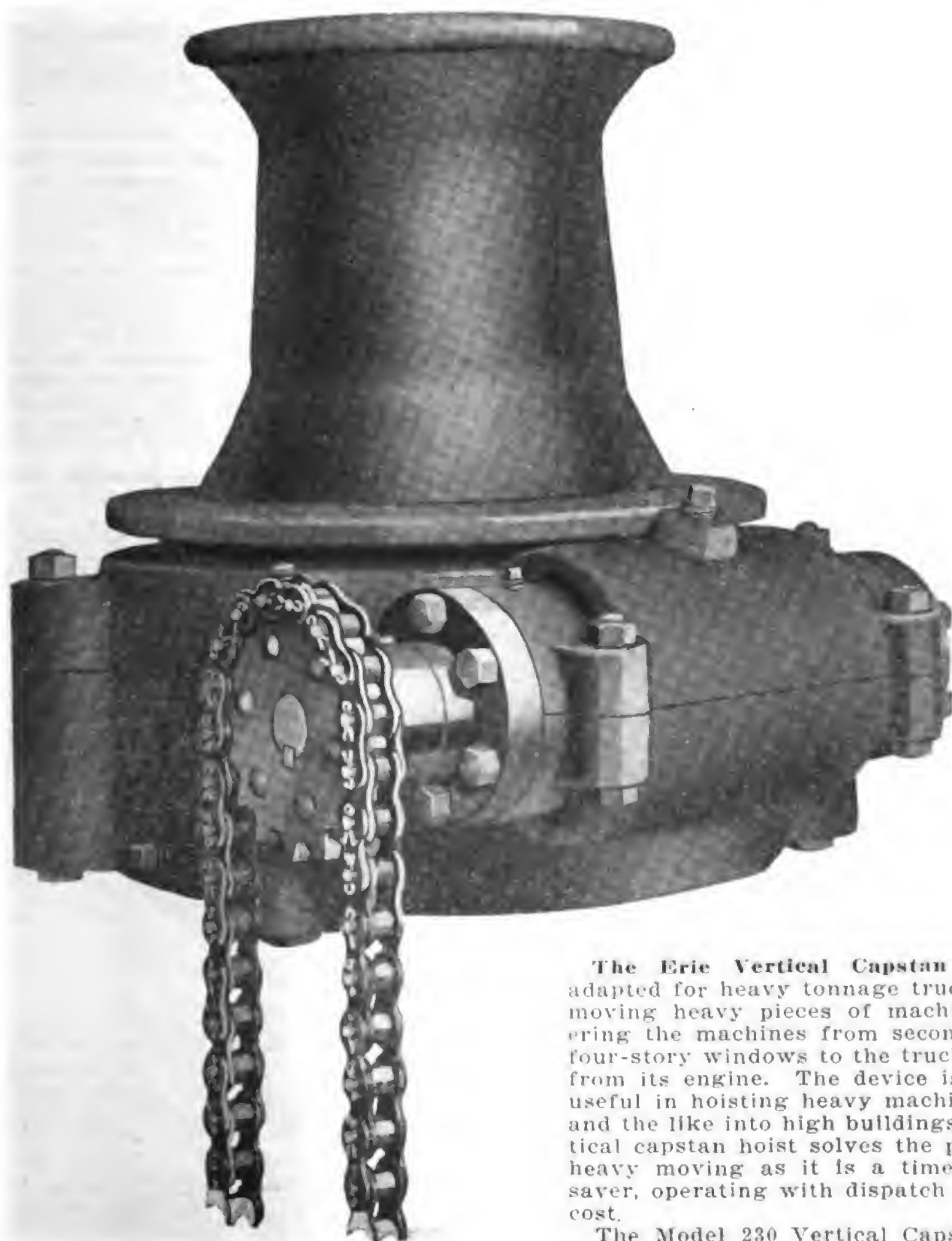
Trax-Yun Chains are stated by the manufacturer to be especially suited for trucks engaged in heavy-duty service. Larger links are used than are required in the

construction of the cross chains and they are positioned by a special type of link which allows a certain amount of movement on the face of the tire, preventing gouging it when starting under load or on



pavements. Coiled springs connect the ends of the cross chains with a center ring distancing the chains on the tire and providing equal tension on them. Trax-yun chains are adapted for fully 99 per cent. of all trucks manufactured and are made to fit either single, dual or block solids, as well as giant and single pneumatics.

Manufactured by the Cleveland Chain and Manufacturing Co., Cleveland, O.



The **Erie Vertical Capstan Winch** is adapted for heavy tonnage trucks used in moving heavy pieces of machinery, lowering the machines from second, third or four-story windows to the truck by power from its engine. The device is also very useful in hoisting heavy machinery, safes and the like into high buildings. The vertical capstan hoist solves the problems of heavy moving as it is a time and labor saver, operating with dispatch and at low cost.

The Model 230 Vertical Capstan Winch

is a heavy-duty type, constructed especially rugged throughout to withstand rough usage. One advantage that it possesses is that it is able to pull from any angle, or from the sides of the truck, without the use of sheaves.

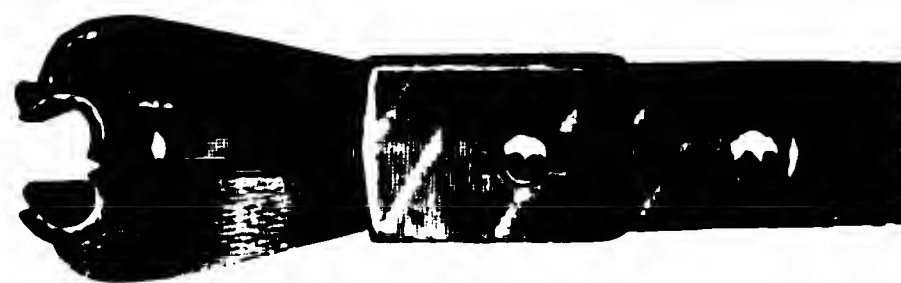
The capstan is mounted on either an I-beam base or a low frame platform at the rear of the driver's seat and occupies but little space. The driving sprocket can be placed on either side of the winch, according to the convenience for driving. It is always ready at a moment's notice to pull the truck out of the ditch from soft spots in the road, or up a steep, slippery hill. In logging countries and oil fields its usefulness is unlimited.

The gearing is protected in a dirt-proof housing and operates in a bath of oil.

The pulling capacity with a single line is 7000 pounds; the rope speed, with drive shaft running at 600 revolutions a minute, is 30 feet a minute. It occupies a floor space of 18 by 22 inches, stands 20 inches high and weighs 535 pounds.

Manufactured by the Erie Hoist Co., Erie, Pa.

The **Valve Keeper Insertor** is claimed to be one of the most useful and most necessary tools ever invented for garage men. It adjusts itself to the many various sizes and shapes of keepers through jaws that open and close by the simple action of pulling or pushing with the thumb on a knob on the tool handle. In addition to positively gripping the keeper by these jaws, the tool supports it at the same time



on a frame under the jaws. This frame extends beyond the jaws and is formed in to center slightly so that the keeper cannot flip out of the end as it often does from the fingers, pliers and other makeshifts.

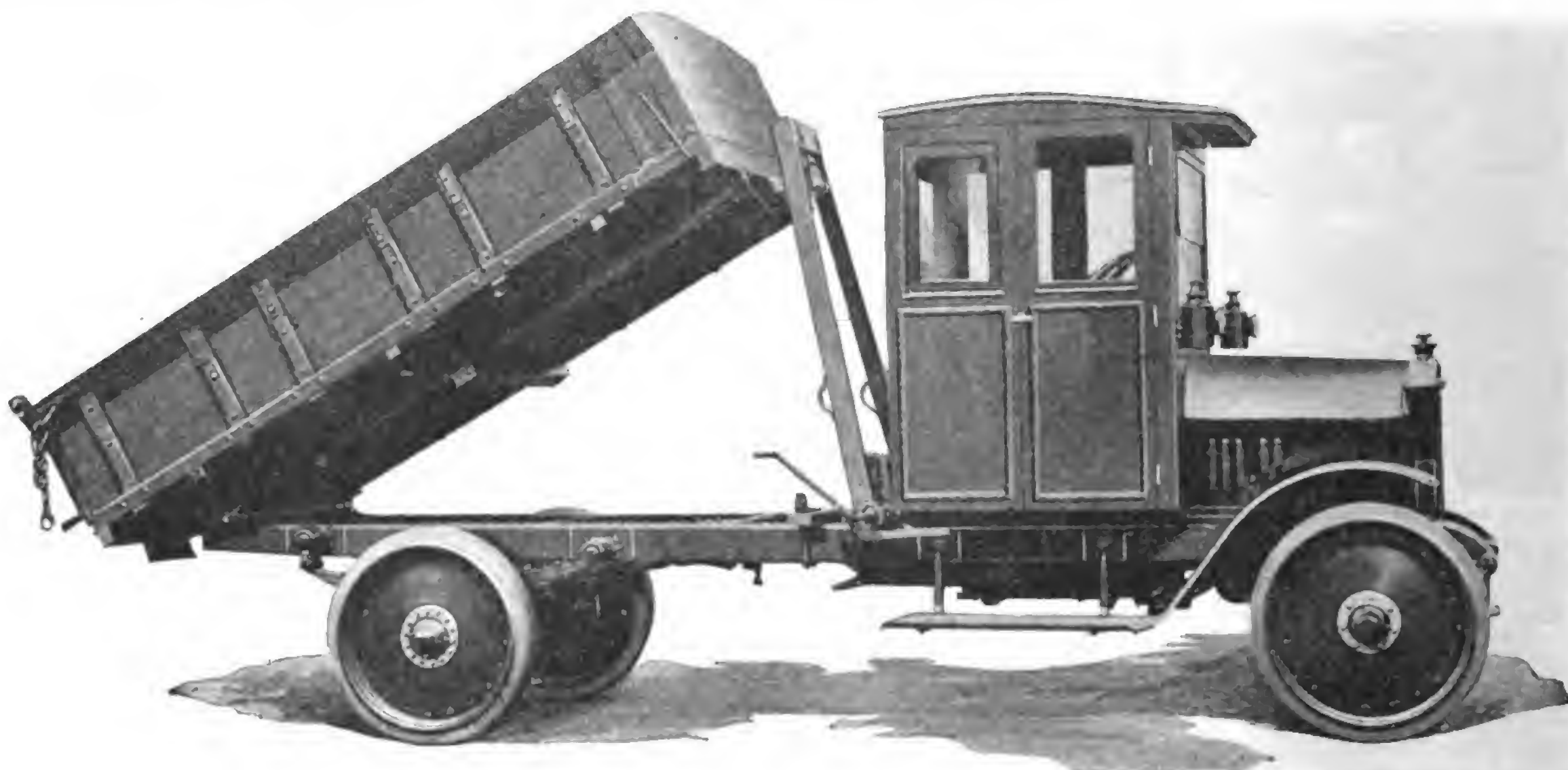
Manufactured by the Service Equipment Co., 4730 Troost Avenue, Kansas City, Mo.

Practical Tools and Equipment

The Rock Hand Hoist offers motor truck owners a low cost dumping equipment, which may be easily attached to any truck chassis in a few hours' time, enab-

is claimed, will efficiently handle all loads up to and including $3\frac{1}{2}$ tons. It can be bolted directly to the flange of the frame side members, or can be installed by

posed upon the front end of the body. Rollers, guides or springs are not required in fitting the Rock hand hoist to control the position of the mast or swing-



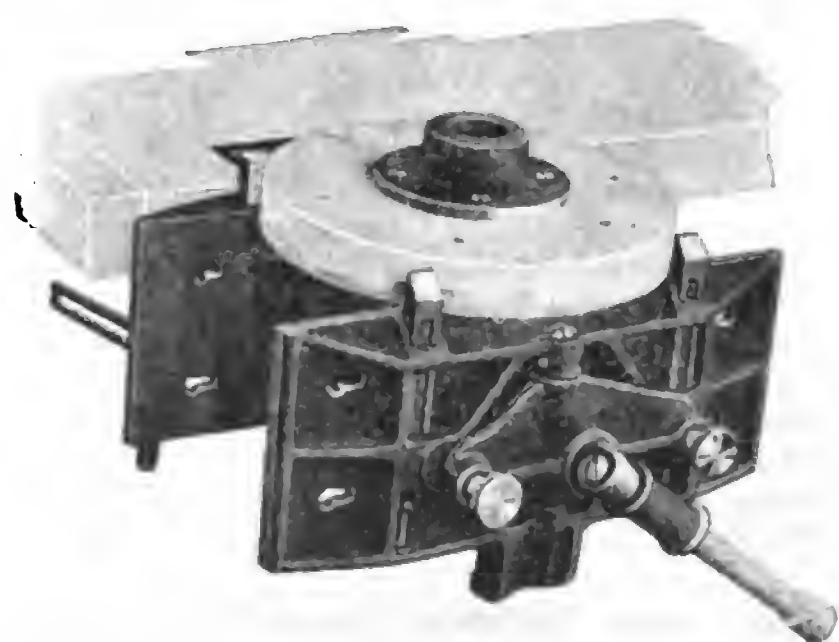
ling the owner to handle bulk material, such as sand, coal, gravel, coke, etc., in much quicker time, saving the rehandling of the material and extra labor. The Rock Hand Hoist fits any truck chassis and, it

means of clips, in which case drilling extra holes is unnecessary. Attachment to the body is made by means of four bolts through the body cross sills, so that, in lifting the load, no strain whatever is im-

posed upon the front end of the body. Rollers, guides or springs are not required in fitting the Rock hand hoist to control the position of the mast or swing-

Manufactured by the Waterloo Body Corporation, Waterloo, N. Y.

The Oliver No. 1 Universal Vise is especially designed for pattern makers, wood workers, machinists, repair men and others who have use for a particularly effective vise which may be turned at any angle and will hold the work securely.



Many special features are incorporated in this vise whereby jobs which would require to be shifted over several times in the ordinary tool may be handled once with the Universal vise with ease.

The quality of the materials used are stated to be the best that the market af-

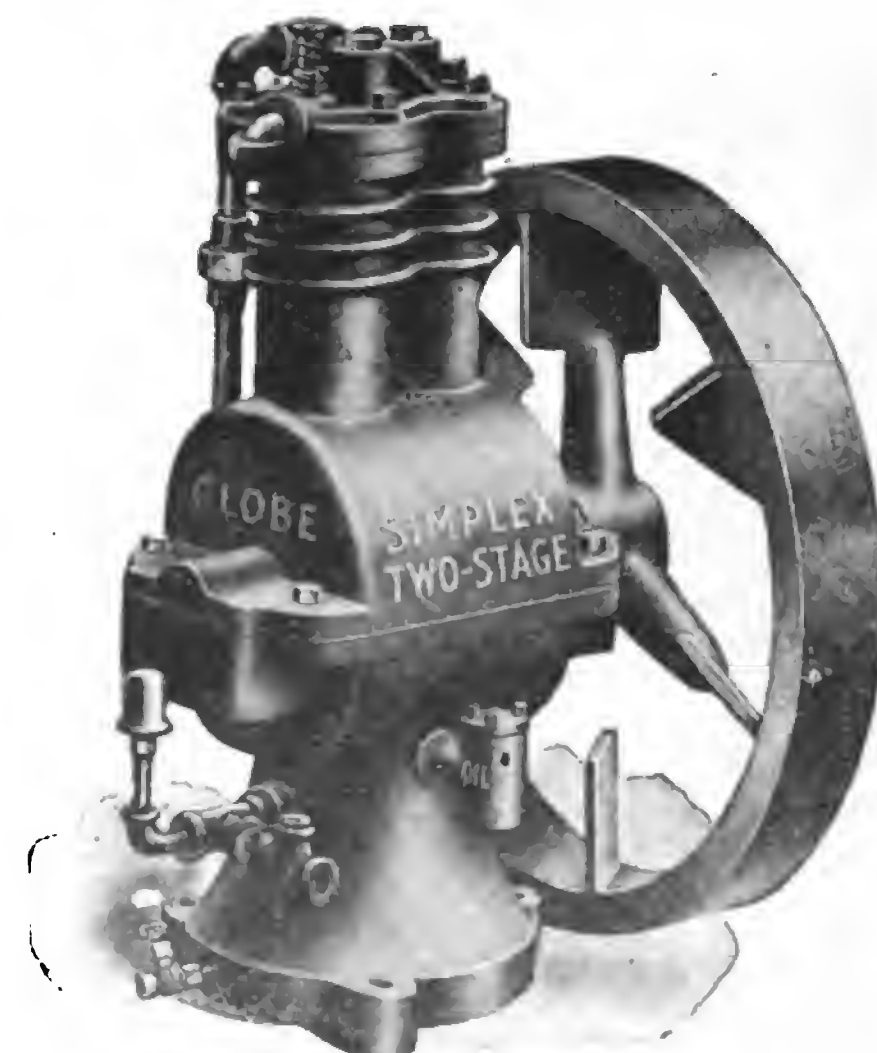
fords and the rapid handling of work is assured by its use.

Several sizes are manufactured to fit the needs of all lines of work, the vise being made unusually strong to resist the severe strains encountered.

Manufactured by the Oliver Machinery Co., Grand Rapids, Mich.

The Globe-Simplex Two-Stage Compressor has been especially designed to meet the increasing demand for a unit which would successfully inflate the larger sizes of cord pneumatic truck tires now in use.

This is a very compact equipment, oc-

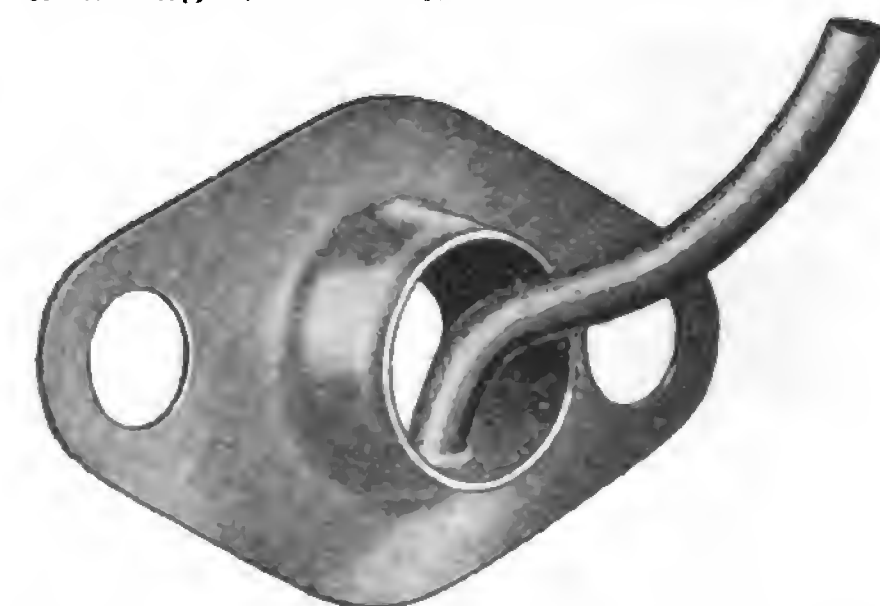


cupying but little space in the garage and may be driven by electric motor or gasoline engine as desired. The company states that it is very simple in construction and is the result of over 15 years' ex-

perience on the part of the company's engineers. Four years have been given over to its rigid trying out. The two cylinders, high and low pressure, are cast en bloc, while the crank case is also cast en bloc, with a condensing chamber integral for separating moisture from the air. Lubrication of the compressor is automatic and is accomplished by the dipping of small pins into the lubricant contained in the bottom of the crank case. Two sizes with all necessary equipment are furnished, which will meet all the requirements of the trade, it is claimed.

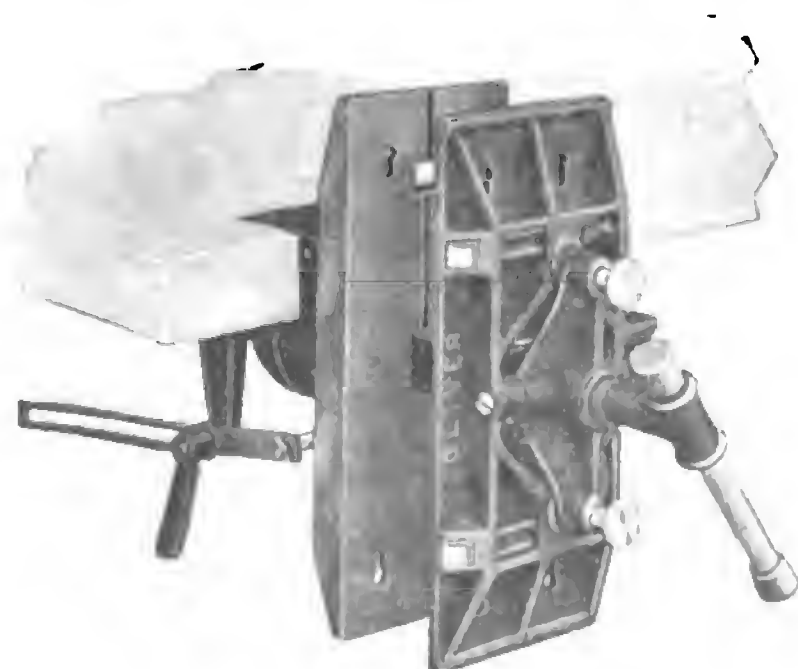
Manufactured by the Globe Manufacturing Co., Battle Creek, Mich.

The Penberthy Re-Atomizer is one of the most recent innovations in the accessory field, the designers of which have tackled the gas saving problem from a new angle, working on the theory that if



all of the gasoline can be properly vaporized and the vapor distributed evenly into the cylinders, not only will the gasoline mileage be greatly increased, but a great variety of motor troubles, caused by liquid gasoline entering the cylinders and crank case, will be avoided.

Manufactured and guaranteed by the Penberthy Injector Co., Holden Avenue and Grand Trunk railway, Detroit, Mich.



Big Motor Bus Line Is Planned for Greater New York

Company Formed to Compete with Trolleys and Bus Lines Will Be Capitalized Heavily Enough to Spend Close to \$20,000,000 for Vehicles.

NEW YORK, Oct. 20.—A description of 100 bus routes to cover all five boroughs of the city, and over which it is proposed to operate 2000 busses at a five-cent fare, has been sent to the board of estimate by Benjamin Shepard, an attorney, of 154 Nassau street, acting for Austin P. Fox of the City Transit Co. The company made application for franchises several months ago and was asked for more specific information as to the routes and the type of bus. The new company would compete with street cars and the present 10-cent bus lines.

In a letter accompanying the description of the routes Mr. Shepard says the busses can be put in operation within 30 days after approval of the franchise by installing from 100 to 500 busses, and a like number every 30 days thereafter. The fare would be five cents on the main lines, with transfer privileges, and one cent on each of the four bridge local lines. The average cost of the busses, which would be of single and double-deck type, would be \$10,000 and the entire outlay for busses more than \$20,000,000.

Mr. Shepard would not give the names of those who are to furnish capital for the enterprise, nor would he say how much capital had been paid in. The City Transit Co. is a holding company, he explained, with a capitalization of \$100,000. Appended to the letter describing the lines is a list of names of those interested in the company, most of whom, he explained, were acting for men who intended to invest in the company. The men mentioned in the letter are:

Austen P. Fox, head of Austen P. Fox & Co.; Harry Dorsen, general manager Polish Navigation Co.; Dr. Harry Wechsler, head of Yale Chemical Co.; Benjamin Shepard, Dr. Edward Levy, Louis Spiegel, attorney; Louis J. Saltzman, real estate; H. Bernard Greenberg, attorney; Joseph Wexler, Abraham Weiss, attorney; Robert A. Dorsen, merchant; Barnett Sumovitch, head of Forty-eighth Street Garage, Inc.; Dr. Walter I. Shapiro, Kacesl Lefkowitz, real estate; Dr. Joseph I. Singer, Samuel Newman, Dr. Samuel R. Greenberg, Aaron Alper, Dr. Louis R. Brager, Samuel Krebs, Dr. Samuel A. Moss, Charles Banmohl, real estate and garages; Max E. Bloch, Stephen F. Spiegel, Custom House broker; Heyman Fox, Nathan H. Jacobson, William Black, Zenith Cream and Cheese Co.; Dr. Edward L. Gerard, Charles Danciger, head of Eagle Hat Lining Co. and Abraham M. Fisch, attorney.

The routes include the following: From the South Ferry up the east side to 150th street and Melrose avenue; from the South Ferry up Broadway to the Polo grounds; between Washington square and 181st street on Fifth avenue and Riverside drive; between Washington square and the Polo grounds via Fifth avenue; between the Pennsylvania ter-

minal and 155th street and Eighth avenue, via Fifth avenue; between the Penn-

"LIZZIE" DE LUXE.

DETROIT, MICH., Nov. 10.

—It is rumored that Henry Ford has bought for his own use a \$15,000 automobile, built by the Lancaster Motor Co. of Birmingham, England, the information coming from George H. Lancaster, technical chief of the company, who has just sailed for home on board the White Star steamship Olympic. The Lancaster car, according to its designer, is the most expensive automobile made in Great Britain, and the car ordered by Mr. Ford, it is said, will be the finest the company can turn out.

sylvania terminal and the Dyckman street ferry, via Riverside drive; a West End avenue line and many other lines.

TO USE WAR MATERIAL.

WASHINGTON, D. C., Nov. 9.—The government is putting to good use the material that was left over after the war and which was originally intended for service in France.

"It is interesting to note that the government is putting to use some of the material that was left over after the war, for use in federal road-building schemes," says J. W. Frawley of the Frawley Motor Co., Mitchell distributor. "Sectional steel bridges, easily handled and ready for instant use, which were constructed during the war for use in France, have been turned over by the War Department to the Bureau of Public Roads, United States Department of Agriculture, and now are finding profitable peace-time use on road ways in the national forests, on roads built by the bureau in forest areas.

"These sections are built in two sizes, one 17 feet 7½ inches long, intended for the ends of the bridge; the other 11 feet three inches long and designed for intermediate sections. By combining the two kinds, bridges varying from 35 to 91 feet long can be built. The height of the trusses are five feet 11 inches and the bridges when erected have a road way 11 feet wide.

PLANS UNIFIED SYSTEM.

LOS ANGELES, CAL., Nov. 9.—Following the initial steps taken here by the railroad commission in placing California automobile freight and passenger carriers, whose gross income is more than \$20,000 annually, under a uniform system of account, the commission decided to hold another hearing on the question, after which the modified system of accounts will be put in effect.

All automobile carriers are now required to make an annual report to the railroad commission, but the commission holds that a unification of the accounting system will clarify records, make more rapid and fairer decisions possible and work to the benefit of both the commission and the carriers. The unified system under which the roads will be placed, the commission said, will be similar to that which now applies to railroads.



Signs of Winter.—This Winther Four-Wheel Drive Is Equipped with a Rotary Snow Plow Which Is Operated by a Wisconsin Engine Mounted in Rear of Cab and Controlled by Levers—Opens 7½-Foot Path and Throws Snow Distance of 50 Feet.

Republic Truck Asks Note Extension

Has Mailed to Note Holders
Request for Longer Time
Limit.

ALMA, MICH., Nov. 10.—The Republic Motor Truck Co. is mailing to note holders a request for an extension until 1926 on \$500,000 of its \$2,500,000 seven per cent. serial notes which matured Nov. 1. The request is made because of business conditions, which have not permitted the liquidation of sufficient inventories.

It was announced that a plan was in preparation, with the approval of the bankers, which provides for the payment of interest on the extended notes. The rate is to be increased to eight per cent., it is said, and an adequate sinking fund will be provided. The same security will be given as under the present mortgage.

Confidence is expressed by the bankers that, with the extension plan adopted, the Republic company will be able to meet all its claims in full. It is understood that bank creditors have intimated their willingness to renew their loans.

In the balance sheet of Sept. 30 the company reports cash amounting to about \$500,000, the amount of the note installment due. The bankers have refused to let this be withdrawn since it would leave the company without working capital. Current assets total \$5,636,000 and current liabilities are about \$1,941,000, making a net working capital of \$3,695,000.

SURVIVES HARD TEST.

BUFFALO, N. Y., Nov. 12.—The most destructive test ever applied to a motor truck recently was completed by the Pierce-Arrow Motor Car Co. of Buffalo, N. Y. The truck, a standard five-ton Dual Valve unit, was subjected to 12,200 front and rear-end collisions. No breakage of any part resulted; in fact, at the conclusion of the test the truck immediately was started on a long test run.

To produce the 12,200 shocks the truck was placed in a steel cradle and run back

ROAD WORK LEADS.

WASHINGTON, D. C., Nov. 11.—Figures obtained from the census of 1920 on manufacturers, issued by the Bureau of Census, Department of Commerce, show that, of contractors' equipment manufactured in 1919, valued at \$186,297,000, machinery used to a large extent in highway construction formed the major part, with a total value of \$105,149,000. Concrete mixers manufactured were valued at \$9,570,000; excavating machinery at \$6,641,000; pumps, \$65,360,000; road-building machinery, \$13,915,000, and steam shovels, \$9,654,000.

and forth under its own power, so that it struck steel blocks at either end. A load of 7½ tons was placed on the truck. The force of the blows was so severe that four men alternated in driving the truck, changing every 20 minutes.

"The force of the blow which the rear wheels struck can be compared to a pile driver," said one of the company's experimental engineers. "It would be equivalent to a one-ton pile driver dropping a height of 30 feet striking a pile which moves three inches at each blow. It would require 3500 such blows to equal the total punishment which the truck withstood."

TAKES OVER JACKSON.

JACKSON, MICH., Nov. 9.—Officials of the Jackson Motors Corporation have announced that all property belonging to the concern was taken over Oct. 29 by the Associated Motors Industries. The new organization consists of a strong group of passenger car, truck and auto parts companies who have united to meet the changed conditions in the automobile industry. The consideration is said to be \$1,105,000, to be paid in the eight per cent. cumulative preferred stock of the Associated Motors Industry.

Dixie Bus Caravan En Route South

Great Lakes to Gulf the 1100-
Mile Itinerary of Sight-
Seers.

CHICAGO, ILL., Nov. 7.—Known as the Dixie Bus caravan, four White 10-passenger busses, accompanied by a fleet of privately owned touring cars, left Chicago recently with tourists bound for New Orleans. The bus tour from the Great Lakes to the Gulf of Mexico was conducted by the T. and S. Tours Co. of Chicago, owner of the busses, with Harry J. Morris, manager of the motor travel department of the company, in charge.

The busses covered 1135 miles on the Lake-to-Gulf jaunt. The route was by the way of Danville, Ill.; Columbus, Ind.; New Albany, Ind.; Louisville, Mammoth Cave, Nashville, Florence, Ala.; Meridian, Miss.; Hattiesburg, Miss., and Bogalusa, La.

The tourists were given a day stop-over at Mammoth Cave and sight-seeing tours were conducted in the principal cities through which the caravan passed. The party was entertained by chambers of commerce and civic organizations in virtually all cities in which night stops were made.

While lengthy trips by motor bus are not uncommon, especially in the scenic regions of the West, the Dixie Bus caravan was the first organized service enabling tourists to make a highway tour to a far-off winter resort, with an opportunity to see the chief points of interest along the route.

The bus caravan idea proved to be a popular one from the very start and the seating capacity of the caravan was quickly taken up following the announcement of the tour. Scores who desired to make the trip could not be accommodated.

CLIMBS MT. WILSON.

LOS ANGELES, CAL., Nov. 12.—Carrying a capacity load to the top of Mt. Wilson was the climax of a two-day test recently given the Republic Rapid Transit at Los Angeles. The Rapid Transit climbed an elevation of 6000 feet in nine miles, without boiling the water in the radiator.

Previous to the Mt. Wilson climb the Republic Rapid Transit had been driven through an orange grove, over ground that was being prepared for irrigation. It had blazed a trail through the desert, over cactus, sage brush and rocks, and its driver had been stopped by a motorcycle policeman for exceeding the speed limit.

The trip up the mountain side was accomplished without difficulty, except that on some of the narrow "switchbacks" on the road, the driver and his passenger made mental calculation of the distance to fall if the brakes failed to hold. However, the brakes held safely.



Three Eras of Transportation in India as Exemplified in Building Supply Industry.
Basket-Bearing Natives, Ox Teams and the Motor Truck.

Increase in Exports of Automotive Products in September

Reported Gain of 23 Per Cent. in Number and 11 Per Cent. in Value—First Time in Year Monthly Shipments Have Exceeded Previous Month.

WASHINGTON, D. C., Nov. 10.—Automotive products exported in September showed an increase of slightly more than nine per cent. over August exports. This is the first time this year that any monthly shipments have been in excess of the previous month. All automotive products, with the exception of cars, which showed a decrease of two per cent. in number, gained in September over August.

The total number of trucks shipped in September was 472, valued at \$481,664, as against 381 in August, valued at \$434,052. This is a gain in number of 23 per cent. and in value of 11 per cent. The gain in September over August is greater than the gain in August over July, which was 12 per cent. in number and six per cent. in value. The total gain in September over July in point of number is 39 per cent., and in value, of 53 per cent. Compared with September of last year, of course, the figures this year show a decrease. During the month of September, 1920, 1747 trucks were shipped, valued at \$3,053,028. Comparison between the total shipments from Jan. 1 to Sept. 30, 1920, with the same period for 1921 shows a decrease of 73 per cent. This accumulative decrease in terms of percentage up to September compares with the accumulative decrease up to August for eight months and up to July for seven months. The comparative decrease for the seven months up to July was 72 per cent. in number and 72 per cent. in value. For eight months, at the end of August, the decrease was 72 per cent. in number and 74 per cent. in value, while in September the showing was 73 per cent. in number and 74 per cent. in value for the nine months period. These figures show that the bottom in truck exports has probably been reached.

The improvement in truck shipments is unusual, but it is debatable whether the gain made in September over the month of August will hold. In September parts to the value of \$2,570,860 were exported, while in August, \$1,786,886 were shipped, a gain of \$783,974, or 30 per cent. Motorcycles also showed an increase in September over August; shipments amounted to 215, valued at \$60,146, while in September, 627 machines were exported, valued at \$151,380, an increase in number of 191 per cent. and in value of 152 per cent. For several months the motorcycle market has been very low. Whether these figures presage a quick return to the great shipments of 1920 remains to be seen, but it is probable that for some time to come the volume will not be duplicated. In September of last year, 1841 motorcycles were exported, valued at \$556,217.

Japan was the largest buyer in point of

numbers, of commercial vehicles during the month of September, but Canada was first in value taken. Japan took 102 trucks, valued at \$55,256, while Canada took 95, valued at \$117,000. Mexico continues to be among the big buyers, both

TO SPEND \$10,000,000.

NEW YORK, Nov. 14.—The finance committee of the United States Steel Corporation has adopted a resolution requesting its subsidiary companies to expend up to \$10,000,000 in the extension of manufacturing plants, as promptly as circumstances will permit. The extensions will be made, so far as possible, where the services of the company's own employees, who are idle in consequence of diminished operation, can be utilized and where the costs will be fair and reasonable. The extensions will be under the immediate direction of the chairman and president of the corporation.

in number and value, being third, with 72 valued at \$51,031. The United Kingdom is fourth, with 54, valued at \$79,671. The unit value of trucks shipped to England has generally been high.

Mexico was the largest buyer of cars, both in number and value. During September, 507, valued at \$398,145, were shipped. Canada continued to be a large

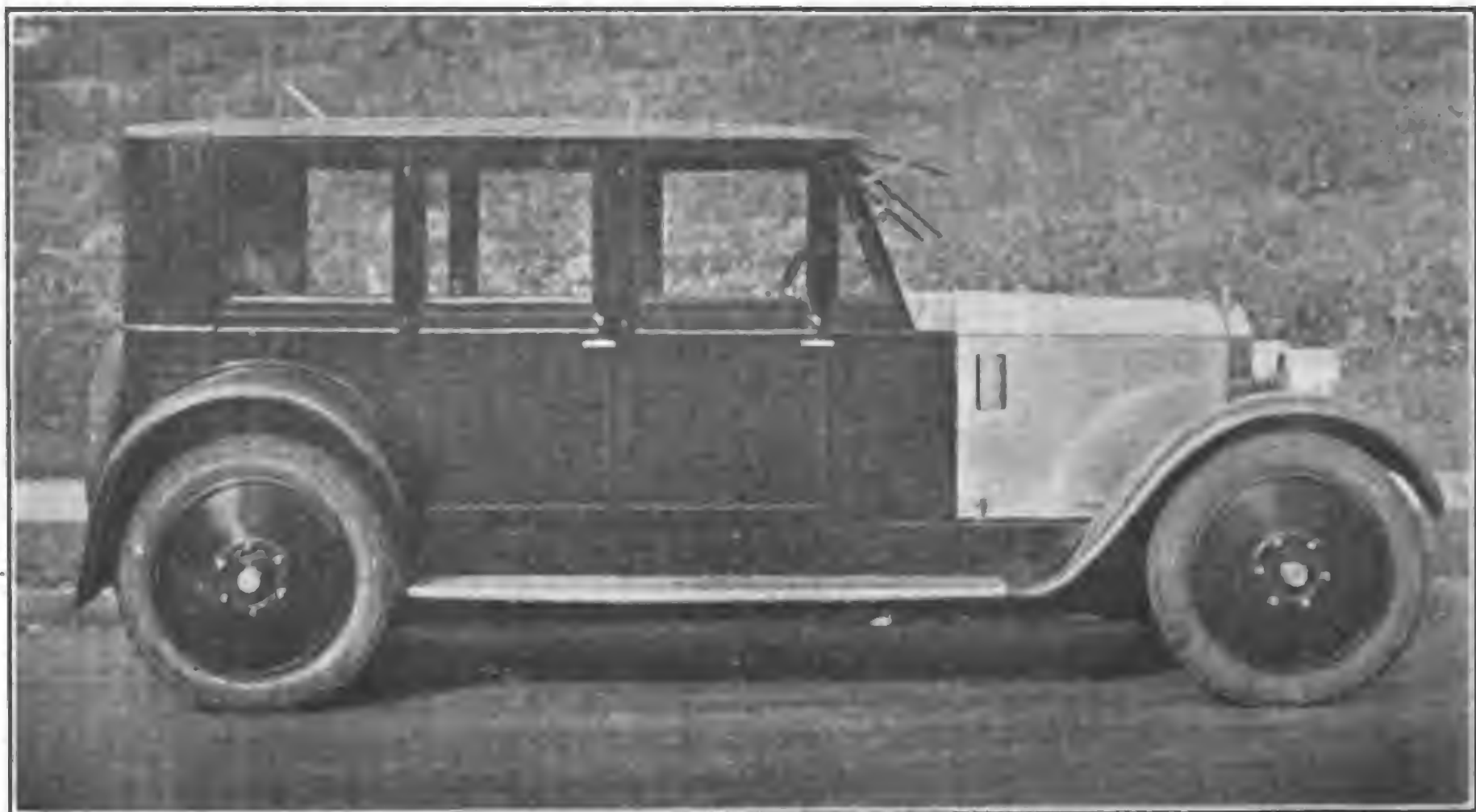
buyer, with 332, valued at \$378,765. There was a gratifying increase in shipments to Australia during September; 334, valued at \$313,828, were shipped in that month. This compares with 162, valued at \$154,285, in August. The increase in the Japanese shipments is very great as compared with August, when but 28 were shipped, valued at \$31,122, while in September 211 were shipped, valued at \$103,807. British India showed an improvement in car shipments over August, the figures for the latter month being 23 in number, valued at \$12,736, as compared with 56, valued at \$64,160, during the month of September. There was a noticeable drop in the shipments to the Dutch East Indies, these having fallen from 117 in August to 42 in September. Cuba, which was one of the largest buyers in 1920, continues to buy but a nominal number, September showing an increase of only two over the August figure, which was 85.

VISITS DELUXE FACTORY.

LOS ANGELES, CAL., Nov. 12.—Walter Hodgkinson, secretary and treasurer of the New Haven Machine Co., large dealer in automotive parts and cylinder regrinders, of New Haven, Conn., made the trip across the continent for the express purpose of spending 10 days at the Clark-Turner Piston Co.'s factory at Los Angeles. Mr. Hodgkinson will return to New Haven by way of Dallas, New Orleans and Tampa, Fla., visiting en route other Deluxe piston distributors in the cities mentioned.

R. W. Gould of the Automotive Parts Co. of San Francisco, is another energetic Deluxe piston distributor, who has been visiting at the Clark-Turner Piston Co.'s factory at Los Angeles, as well as with other factories in the southern end of the state. This trip is one of many that Mr. Gould makes during the course of the year to Los Angeles and to other parts in connection with his branch houses.

Harold A. Duff, travelling representative for the Clark-Turner Piston Co., reports a very large attendance at the automobile show in connection with the recent Dallas state fair.



Showing the Ferguson Car, One of the Recent Distinctive Products in Passenger Car Field—Combines Adequate Power with Light Weight.

War Being Waged On Glaring Lights

California State Association Co-
operates with San Francisco
Traffic Bureau.

SAN FRANCISCO, CAL., Nov. 12.—The campaign being waged by Captain Henry Gleeson, commanding the San Francisco Traffic bureau, in cooperation with the California State Automobile association, against the head light menace, is rapidly reducing flagrant violations to a minimum.

On a recent evening traffic officers stationed themselves at Golden Gate and Van Ness avenues and at 11th and Market streets. Thousands of motor cars passed these stations during the evening and but 45 arrests were made for flagrant violations. According to Captain Gleeson, eight motorists were arrested for failure to have head lights and 37 for failure to have both head lights lighted. Two former raids for similar violations resulted in 526 arrests.

"The head light situation," says Captain Gleeson, "shows marked improvement. Flagrant violations such as failure to equip cars with the proper number of lights have already been reduced to a minimum.

"With the cooperation of the California State Automobile association I now plan to educate the motorists how to adjust and focus head lights to substantially comply with the provisions of the state motor vehicle act. An article setting forth simple instructions will be published. The motorists will be given a certain number of days to comply with the instructions given. Thereafter arrests will follow.

"The success of this campaign means the reduction of deaths and injuries due to automobile accidents and the cooperation of all motorists is asked in the interest of the maximum results."

CHINESE ORDER DENIED.

NEW YORK, Nov. 11.—Current reports that the Chinese government was in the market for 3300 trucks and had closed a

NEW LICENSE PLATE.

ALBANY, N. Y., Nov. 11.—A new method of issuing automobile license plate numbers for 1922, which will help locate stolen cars and identify traffic law violators, was announced last week by the New York state tax commission. The commission previously had discontinued the custom of issuing so-called low or special numbers. Distinctive numbers for passenger cars will be assigned to each county so the police, state troopers and others can determine at once in what county the car is registered. Though the special numbers have been abandoned, the first 2000 numbers will be reserved for state-owned cars. The remainder will be distributed in the order of application at Manhattan, Brooklyn, Albany and Buffalo and from 56 county clerks offices elsewhere. The law provides that 25 per cent. of all license fees paid must be returned to the county of which the licensee is a resident.

deal with a Canadian firm were denied by the Automotive division of the Department of Commerce in a communication to the National Automobile Chamber of Commerce.

Merchants and officials in Shanghai were specially interviewed on this subject by the United States commercial attache at the cabled request of this newly created division. The opinion was that the number of trucks reported sold to the Shanghai Motor Co. was entirely out of proportion to the present market demand; furthermore, that the Chinese government had no funds available for subsidiaries to encourage motor truck transportation.

The Automotive division, which was created by Secretary Hoover cooperatively with manufacturers in accordance with his plan of commodity groups, is now functioning along these lines.

Steel Earnings Gain in September

But Are Not Sufficient, However, to
Pay the Common Stock
Dividend.

NEW YORK, Nov. 14.—Failure of the United States Steel Corporation to earn anything on the common stock in the September quarter, or in fact, to earn fully its preferred dividend, was overshadowed in the eyes of the stock market by the distinct tendency toward recovery in earning power in August and September after the low point had been touched in July. The net gain month by month was the result not only of the increase in operations from below 30 per cent. in July to 38 per cent. at the close of September, but also of operating economies. The Steel Corporation abrogated the so-called "basic" or "overtime" day, effective July 16, and late in August wages and salaries were reduced, the pay of common labor being made 30 cents an hour, or the level which prevailed May 1, 1917. Operations have continued to gain during the present month.

The \$5,157,000 net earnings for July were much the smallest since the war panic period of January, 1915; but earnings for August rose to \$6,502,000 and for September to \$7,257,000.

Only \$1.58 of the \$1.75 due on the preferred stock was available after the payment of the interest on outstanding bonds. The balance for the common stock for the nine months ended Sept. 30 equalled \$2.03 a share.

One of the two most significant statements in the weekly review of the Iron Age is that October was proving the best month of the year so far in the export trade in steel products, even although the total is small. The other is that the leading maker of low-priced motor cars has cut its production schedule for November 50 per cent., this affecting the demand for that group of steel products in use in the automobile trade.

TRUCKS INCREASE.

PONTIANAK, NETHERLANDS EAST INDIA, Nov. 1.—The British Chamber of Commerce for the Netherlands East Indies, reports, in Eastern Engineering, that as a result of the rapid development of northeast Borneo, the volume of freight is growing. Several good roads have been constructed and the projected railway from Pontianak to Sambas will afford very much needed transport facilities. The market, actual and potential, for commercial motor vehicles is particularly worthy of exploitation, and it is stated that there is an ever-present demand in northwest Borneo for the three to five-ton type of vehicle. The projected railway can hardly absorb all the traffic which now uses the roads, and the estates will require transports for their produce to the nearest railway. The making of good roads is helping this development.



Plant of McKay Carriage Co., Maker of Commercial Bodies, at Grove City, Pa.—New Addition is the Low Building in the Background.

National Implement Association Votes to Change Name

Is Now National Association of Farm Equipment Manufacturers—Work of Committees During Year Outlined—New Pump Division to Be Added.

CHICAGO, ILL., Nov. 10.—The part which the National Implement & Vehicle association has taken in the effort to place the country on a normal basis was vividly pictured by W. H. Stackhouse of Springfield, O., in opening the 28th annual convention of the association in the Congress hotel. He referred to the conferences during the past year with President Harding and other administrative officers, and outlined the recommendations of the association on federal taxation and other matters which were submitted at these meetings.

The repeal of the Adamson act and abrogation of the national agreements were advocated as a prerequisite in obtaining lower freight rates. Reciprocity with Canada, insofar as importation of farm machinery is concerned, was declared imperative to safeguard the implement industry. Failure of the administration to make the repeal of the excess profits tax effective as of Jan. 1, 1921, was labeled a violation of its pre-election pledge.

Changes Name.

Regular routine business was discussed at the meetings and at the closing session the convention voted to change the name of the association to the National Association of Farm Equipment Manufacturers.

The work of the committees in the various departments of the association during the past year was outlined by William Black of Louisville, Ky., executive chairman, who called attention, among other points, to the exceptionally effective work which the traffic committee, cooperating with the traffic manager of the association, has done in the way of obtaining a favorable revision of rates and classifications which have resulted in

considerable saving in transportation costs.

H. J. Sameit, secretary of the associa-

HAS TROLLEY BUS.

RICHMOND, VA., Nov. 12. —Emerging from the experimental stage the trolley bus is in general use in this city, which has had a number of trolley busses in operation for some time and the new vehicles are a much less expensive method of transportation than a street car system. In appearance the new busses are somewhat similar to the one-man street cars used in the small cities. They are operated on the prepayment plan, with mechanical door control. Other working features are the "dead man's handle," emergency rear door and powerful railway motor. Except that the car gains its power from overhead trolley lines, it is operated in all respects like a big motor bus. It may be guided in and out of the traffic, brought into and away from the curb. The trolley busses now in use will seat 30 and take 15 standees, the seats being roomy and comfortably upholstered.

tion, in his report called attention to the support given by all the departments which held 21 meetings during the past

year, with an attendance of 888 individuals. The membership on Oct. 1 was 571, which was divided as follows: Active members, 306; associate, 211; press, 54. He announced that several applications were pending and that a new department composed of pump manufacturers was to be formed. The decision to form this department was the result of a meeting held in Chicago by members and non-members of the association.

During the afternoon of the first day the convention was addressed by Hon. Henry C. Wallace, secretary of agriculture. C. L. Glasgow of Nashville, Mich., representing the National Federation of Implement & Vehicle Dealers' associations, announced that the retailers of farm machinery are taking their losses gracefully and that "labor should make its fair contribution in a lower wage scale, more hours and better service."

Grant Wright, secretary of the Eastern Federation of Farm Machinery Dealers' associations, described the "Ideal Implement Dealer" as one with the requisite capital to conduct his business, an attractive store, knowledge of his costs and knowledge of his market. He also said that the ideal dealer is one who sells on terms which will permit him to meet his obligations.

What standardization of farm machinery has done and can still do in the way of releasing men from the farm to other pursuits was pictured by Dr. E. A. White, president of the American Society of Agricultural Engineers, last speaker of day.

"Can Farm Machinery Business Methods Be Better Conducted" was discussed the morning of the second day by C. S. Brantingham, president of the Emerson-Brantingham Co., Rockford, Ill.; L. R. Clausen, vice president of Deere & Co., Moline, Ill., and C. F. Huhlein, chairman of the board.

What the farm machinery industry may look forward to during the next 12 months was the theme of an address by William Black, president of B. F. Avery & Sons, Louisville, Ky.

The way in which the National Implement & Vehicle association functions to benefit its members was pointed out by J. B. Bartholomew, president of the Avery Co., Peoria, Ill.

(Continued on Next Page.)



Wood Wheel Factory of Hayes Wheel Co. at Anderson, Ind.—Only One of Immense Plants of This Progressive Concern.

American Lubrication Engineers Hold First Convention

Programme Carried Out Was of Vital Interest to This Section of the Industry—Plants of Middle West Concerns Visited by Delegates.

CHICAGO, ILL., Nov. 10.—The first annual convention of the American Society of Lubrication Engineers was held in the assembly rooms of the Drake hotel Oct. 12 and 13.

The programme was as follows:

Wednesday, Oct. 12—10 a. m., meeting called to order by president, W. F. Parish, Chicago. Opening address by the president. Discussion. Address, "The Lubrication Engineer," by W. H. Bailey, chief engineer Illinois Steel Co., Chicago. Discussion. Address, "Oil Analyst and Lubrication Engineer," by Dr. W. F. Faragher, Mellon Institute of Industrial Research, Pittsburgh, Pa. Discussion. Address, "Electrical Railway Lubrication," by Dean Treat, lubrication engineer, the Standard Oil Co. of Indiana.

Afternoon Session—2:30 p. m., general assembly previous to visiting the plants of the Western Electric Co., Hawthorne, Ill., and the Commonwealth Edison Co., Chicago.

Thursday, Oct. 13—Forenoon session, 10 a. m., discussion. Address, "Dilution of Crank Case Oil," by C. M. Larson, supervising engineer, Sinclair Refining Co., Chicago. Discussion. Address, "The Effect of Boiler Foaming on Cylinder Lubrication," by E. L. Gross, vice president Perolin Co. of America, Chicago. Discussion. Address, "Theory of Lubrication," by W. F. Parish, consulting lubrication engineer, Chicago.

Following the afternoon session the members and their guests visited the plant of the Standard Oil Co. of Indiana at Whiting, Ind.

WAR AGAINST "OUTLAWS."

SAN DIEGO, CAL., Nov. 14.—The Motor Carriers' association here has started proceedings with the railroad commission to stop the operation of so-called "outlaw" passenger and freight automobile

carriers who, the association claims, are operating without licenses and in violation of the State Transportation act between San Francisco, Los Angeles, San

SHOWS STAGE COACH.

KANSAS CITY, MO., Nov. 12.—One of the features of a recent parade announcing a price reduction on the Hupmobile was the old transcontinental stage coach which was driven in its heyday by the famous Hank Monk. This stage is said to have carried such notables as Horace Greeley, one time candidate for the Presidency of the United States, and Mark Twain, beloved American man of letters. The coach was loaned through the courtesy of the American Railway Express Co. and the Wells-Fargo National bank. It is said that one of the old runs of this stage, from Sacramento to St. Joseph, Mo., required 17 days. It is also stated that this stage figured in a dramatic hold-up at Bullion, on the Placerville road, when a large amount of treasure was lifted by stage bandits.

Diego and Bakersfield. Those who the commission finds guilty of such operation, the association stated, will be attacked by legal proceedings, following the completion of the commission's hearing. The association is seeking to force the operators to secure licenses from the commission or to stop operations.

The association says the defendant carriers do not operate on any regular schedule, but do secure passengers through advertisements and ticket sales and run when a load is secured. The majority of the defendants are touring or sight-seeing automobile companies or automobile transfer companies.

A case was filed against the McCormick Steamship Co. and others, but when the steamship company produced evidence to show that tickets for travel on such automobile carriers as were included in the complaint had not been sold by the company, action against it was dismissed. Action was also dismissed against Sol Davis, a ticket seller, who proved to the satisfaction of the commission that he had stopped selling tickets on the carriers as soon as he learned that a doubt existed as to the right of such carriers to operate.

The Southern Pacific and the Santa Fe railroads intervened in the hearing, claiming to be interested parties because of the competition which both the association and the defendant carriers established. The attorneys of both companies joined with the attorneys of the Motor Carriers' association.

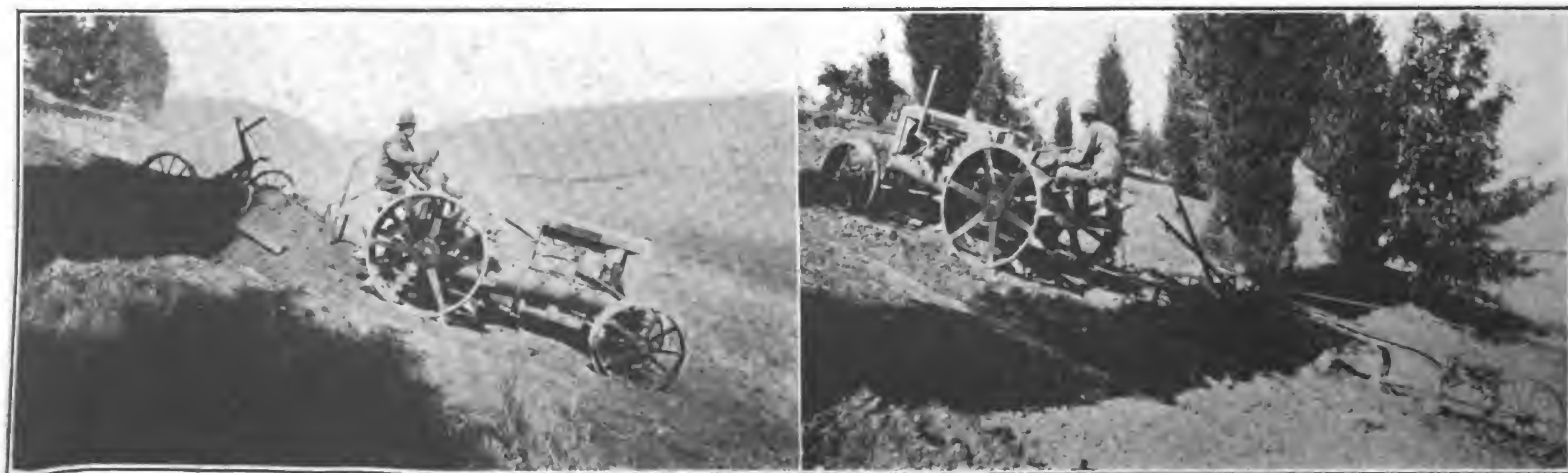
(Continued from Preceding Page.)

The development of the trade press from the early '80s to the present day was traced by E. J. Baker of the Farm Implement News, Chicago, whose address marked the opening of the third day of the convention.

How the Power Farming bureau of the Tractor and Thresher department of the National Implement & Vehicle association is selling the power farming idea was explained by George E. Fuller of Chicago, manager of the bureau.

"The effect of the economic situation on the purchasing power of the farmer" was discussed by James R. Howard, president of the American Farm Bureau federation.

The annual banquet of the association was held on the evening of the last day, with Silas H. Strawn of Chicago as the guest of the evening. Mr. Strawn was one of the committee selected by the Chamber of Commerce of the United States to make an investigation of conditions in Europe during the past summer. His address on "Our Interests Abroad" was followed with unusual interest.



Walls Tractor, Doing Work in a Los Angeles Cemetery That Formerly Required 24 Mules—Only a River Stops a Tractor.

Motor Busses Might Be Big Aid to Railway Systems

Expert Engineer, After Studying Service Abroad, Says That Trackless Trolley Cannot Compete with Conventional Motor Bus Vehicles.

NEW YORK, Nov. 12.—Thousands of motor trucks will be needed for bus lines and thousands more will be sold to industrial concerns as a result of analyzing their businesses, according to speakers at the meeting of the motor truck manufacturers of the National Automobile Chamber of Commerce recently held here.

The motor bus can be a distinct aid to electric railway systems and is rendering such service in a number of communities, according to Walter Jackson, consulting engineer, of Mt. Vernon, N. Y. Where the motor bus relieves congestion at peak traffic periods, if it raises the speed of the street cars only one mile per hour, it is thereby enabling the railway to get 10 per cent. or more work out of its men and rolling stock.

Suburban routes can be served by motor bus when it would not be worth while for the electric company to build spur lines for light traffic. The companies can operate such busses as feeders to the main rail lines, or can operate through bus service at a higher fare. Motor busses are also sometimes profitable when the question of retrackage has to be considered. The investment needed for the motor vehicle may well be far less than the cost of rebuilding the roads especially when the traffic on the particular line is not especially heavy.

Many an electric line, the speaker indicated, would do well to operate organized motor bus systems and thereby protect itself against irresponsible jitney competition.

Trolley Bus Lacks Flexibility.

Mr. Jackson made an extended study of the trolley bus, or trackless trolley, in England. He does not believe that this form of transportation has the future of the bus, because of its lack of flexibility. Like the trolley rail car it is tied down and cannot go into other parts of the city to seek business when trade is dull in some right of way.

Mr. Jackson pictured a great growth in the motor bus business in this country, pointing out that London has a bus system which will carry close to 1,000,000,000 passengers in 1921; that Birmingham has more than 200 bus routes radiating through 16 counties.

May Sell Trucks by Mail.

Motor trucks may be sold increasingly by mail is the opinion of Frank B. Willis, general sales manager of the Duplex Truck Co. This does not mean doing away with the dealer, but rather finding prospects for him.

Motor truck sales and financing, Mr. Willis believes, will be on a better basis as companies devote themselves increasingly to vocational selling. He advo-

cates that the salesman should first learn what the prospect plans to do with the truck, how he wants to use it and in what way it will save him money, before clos-

TO USE BUSSES.

NEW YORK, Nov. 10.—The New Haven railroad is going to use gasoline motor cars instead of steam or electric-driven cars on some of its small branches, of which the road has a great number. The maintenance of service on some of these lines has been a serious problem for the road not only in hard times, but in normal times, for traffic has fallen off almost to the vanishing point, operating costs have risen and franchise requirements have remained unchanged. The cars to be used on the New Haven will look much like the busses familiar to all New Englanders, but they will be longer and heavier than most of the vehicles in use on the highways. They will be equipped with flanged wheels. Each gasoline-driven car will have a compartment for baggage.

ing the deal. It may be that the salesman will represent a class of truck which does not fit the prospect's situation, in

which case he should pass the sale by, as it will only be a source of trouble in the future. Many prospects will be developed by vocational analysis, however, and the purchaser will be trained at the start on how to get the maximum results from his investment.

Improved methods of financing were discussed by John J. Schumann, vice president of the General Motors Acceptance Corporation, and by J. H. Shale, vice president of the Bankers' Security Corporation of New York City.

TRUCK PRICES SLASHED.

ALMA, MICH., Nov. 13.—Prices of the complete line of Republic trucks have been reduced, effective immediately, according to a statement issued by Colonel Frank E. Smith, first vice president and general manager of the Republic Truck Sales Corporation.

The reductions range from \$300 to \$750. Here are the new prices: $\frac{3}{4}$ -ton chassis, \$1250; $\frac{3}{4}$ -ton with completely equipped canopy top express body, \$1395; one-ton chassis, \$1395; $1\frac{1}{2}$ -two-ton chassis, \$1795; $2\frac{1}{2}$ -three-ton chassis, \$2195; $3\frac{1}{2}$ -four-ton chassis, \$3095.

"Transportation is the nation's greatest problem," said Colonel Smith. "With high railroad freight charges, uncertain and delayed deliveries, production in all industries is being seriously curtailed."

"Last year the total freight carried by motor trucks was 1,200,000,000 tons as compared with 2,504,000,000 tons carried by railroads."

"The Republic Truck Sales Corporation is meeting the situation in the most practical method at its disposal, namely, by reducing prices on the whole line of light, medium and heavy Republic models to a level making them among the lowest priced trucks in America."

JOINS DUNLAP-WARD.

CLEVELAND, O., Nov. 12.—William B. Hall, well known in Detroit advertising circles, has left that city to become a member of the staff of the Dunlap-Ward Advertising Co. of Cleveland.



Scene During Test of Ray Battery at Electrical Testing Laboratories, N. Y. City.

French Exports Show Slight Gain

Country Has Diminishing Value as Market for American Motor Trucks and Cars.

PARIS, FRANCE, Nov. 10.—Despite adverse conditions in many markets, which has resulted in the curtailment of United States exports, France has not only held its own in automotive exports, but has increased the value of its shipments by slightly more than five per cent. during the first six months of 1921, as compared with the same period for 1920. Shipments of passenger cars are mainly responsible for the increase, as the export of trucks and also of parts fell off sharply during this period.

During the first six months of this year France exported passenger cars to the value of 383,532,000 francs, as compared with 321,735,000 francs for the same period in 1920. This is an increase of 19 per cent., which was made despite the fact that imports during the first six months of 1921 exceeded those of the same period for 1920 by 585 per cent., the figures being 57,543,000 francs in 1921 as against 8,397,000 francs in 1920. The official French statistics do not show the origin of the imports nor destination of the exports; nor do they show the number of vehicles.

The general increase in the total number of automotive products exported is held down by the reduction in truck shipments. The decrease in the value of trucks exported during the first six months of 1921, as against the same period for 1920, was 23 per cent. During the first six months of 1920, trucks (or freight automobiles, as they are classified by the French) were exported to the value of 148,668,000 francs, while in the same period in 1921 the exports amounted to 114,297,000 francs. Another contributing factor to offset the great increase in passenger automobile exports was the drop in the classification known as bodies, chassis, frames and rims of

NEW TRUCK LINE.

PHILADELPHIA, PA., Nov. 10.—What is stated to be the largest motor transportation company doing business between Philadelphia and New York, has been formed through the consolidation of three of the motor truck carriers certified by the Underwriters' Inspection & Adjustment Co. The new company bears the name, Philadelphia-New York, Ltd., and will carry insurance and issue a receipt to each of its shippers protecting him against the loss of goods. This company operates its busses under armed guards. The president of the organization is Alfred Hare of Philadelphia, a brother of E. S. Hare of Hare's Motors.

iron or steel for automobiles, which during the first six months of 1920 amounted to 1,945,000 francs, as against 1,230,000 francs for the same period in 1921.

The opinion held of the diminishing value of France as a market for American trucks seems to have been justified, as the imports for the first six months of 1919, 1920 and 1921 show a steady decrease. In 1919 trucks were imported to the value of 196,019,000 francs, declining to 138,692,000 francs for the same period in 1920, while in 1921 the imports dropped 99 per cent. to 1,397,000.

VISIT COAST CITY.

SAN FRANCISCO, CAL., Nov. 10.—H. P. Mammen, secretary-treasurer of the Traffic Motor Truck factory of St. Louis, Mo., together with H. H. Hawk, sales manager of that organization, have been visitors in San Francisco during the past week, making their headquarters with the Hirsch Motor Co., distributor of the Traffic truck. Messrs. Mammen and Hawk are on a tour of the Pacific coast territory.

Fisk Increases Number of Directors

H. G. Fisk, Resigning as Treasurer, Is Named Vice President of Organization.

NEW YORK, Nov. 13.—Concurrently with the completion of the recent financing programme, the Fisk Rubber Co. directors at a special meeting increased the number of directors from seven to nine and accepted the resignations of J. D. Anderson, F. T. Ley and G. A. Ludington.

There were elected to fill the vacancies created, William F. Cutler of New York, James Dean of Boston, Richard S. Russell of Boston and Ralph H. Bollard of New York.

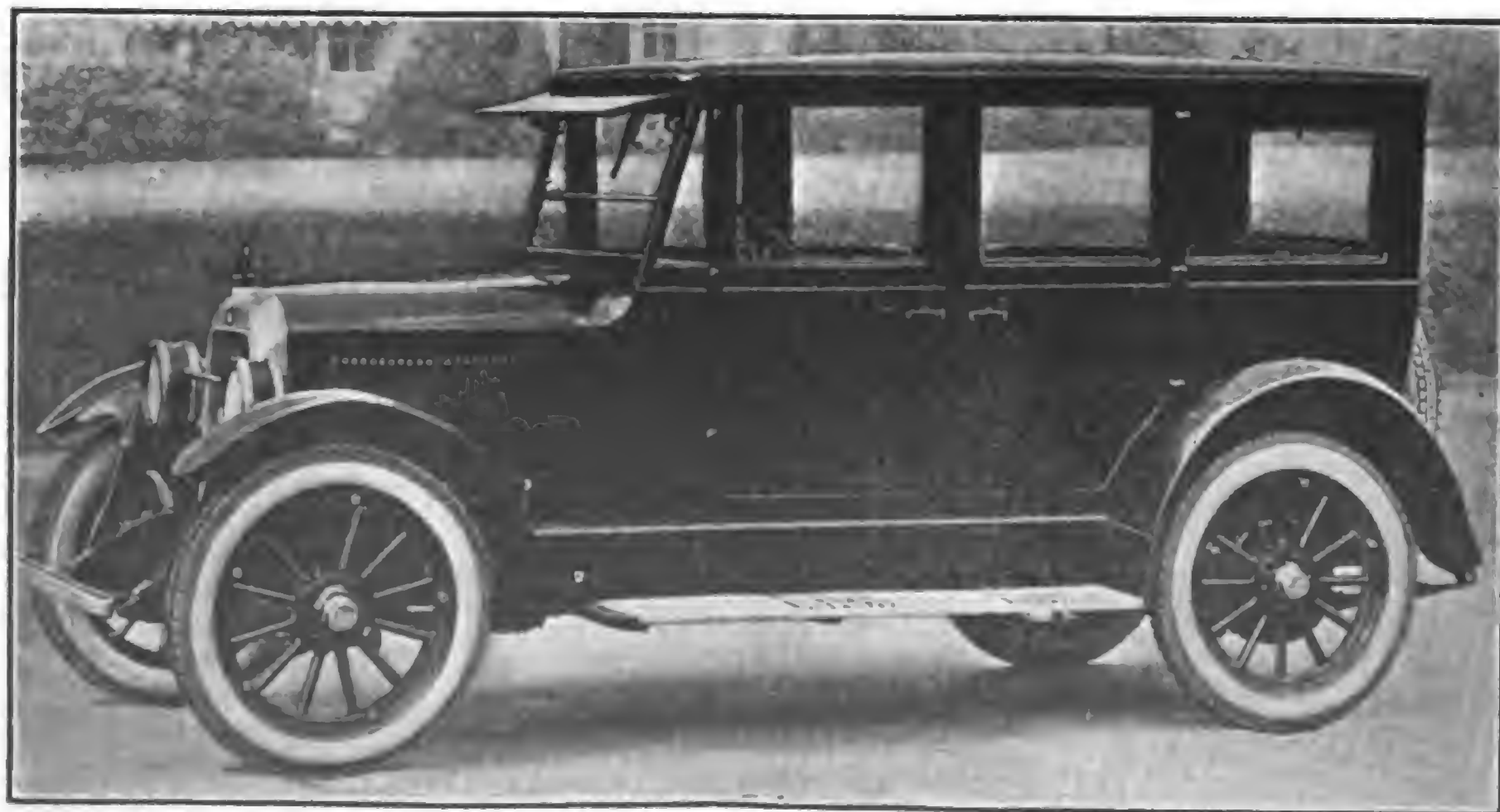
With the centering of the executive departments of the Fisk, Federal and Ninigret companies, under the recent adjustment in New York, the treasury department becomes a part of the New York organization and will hereafter be centered there. H. G. Fisk, who has served as treasurer, will not, on account of outside interests located in Springfield, be transferred to New York. He has resigned as treasurer to become vice president of the company and will continue to make his headquarters at Chicopee Falls. Robert B. McGaw, for a number of years the assistant treasurer, has been elected treasurer and will be located in New York City. J. W. Rowland has been elected assistant treasurer.

The officers and directors are: President, H. T. Dunn, New York; vice president, H. G. Fisk, Springfield, Mass.; vice president and general manager Fisk division, E. H. Broadwell, Longmeadow, Mass.; vice president and factory manager Fisk division, J. D. Anderson, Springfield, Mass.; vice president and general manager Federal division, B. H. Pratt, Milwaukee, Wis.; vice president in charge of rubber and fabric purchases, G. A. Ludington, New York; treasurer, R. B. McGaw, New York; assistant treasurer, J. W. Rowland, New York; comptroller, E. M. Bogardus, New York; secretary, A. A. Leiser, Jr., New York.

Directors: Ralph H. Bollard, New York; Edward H. Broadwell, Longmeadow, Mass.; Stedman Buttrick, Boston; William F. Cutler, New York; James Dean, Boston; Harry T. Dunn, New York; Harry G. Fisk, Springfield, Mass.; Benjamin H. Pratt, Milwaukee, Wis.; Richard S. Russell, Boston.

EXPORTS TO BRAZIL.

RIO DE JANEIRO, BRAZIL, Nov. 1.—From January to April of the present year, Brazil imported 509 automobiles and trucks at a total c. i. f. value of 5823 centos (\$3,285,327, at par value of the gold milreis). During the same period in 1920 imports amounted to 3777 automotive vehicles, valued at 11,941 centos (\$6,522,174).



This Beautiful Closed Model Illustrates in Striking Manner the Rare Design and Workmanship Which Is Characteristic of the Earl Line of Automobiles.

Steel Mill Properties in Big Combine

**Merger Recently Completed Will
Have Assets in Excess of
\$20,000,000.**

MASSILLON, O., Nov. 10.—Steel mill properties with combined assets in excess of \$20,000,000 have been brought together in the merger just completed of the Central Steel Co., the National Pressed Steel Co. and the Massillon Rolling Mill Co., all of Massillon, O.

The new corporation, it is announced, takes the name of the Central Steel Co. and the following officers have been elected: Chairman of board of directors and president, R. E. Bebb; first vice president, F. J. Griffiths; second vice president, C. C. Chase; third vice president, H. M. Naugle; secretary and treasurer, C. E. Stuart.

The reorganized company has outstanding 300,000 shares of no par common stock and \$10,000,000 of preferred stock. The merger of the three companies brings the Central Steel Co. into a prominent position among the largest steel producing corporations of the country with complete modern equipment and facilities for producing all kinds of commercial alloy steels, hot and cold rolled sheets, hot rolled strip steel and light structural steel sections in a combined annual output of 450,000 to 475,000 tons of finished material.

The Central Steel Co. brought to the merger 10 open-hearth furnaces of 65 to 75 tons capacity, a 34-inch blooming mill, 24-inch, 18-inch and 12-inch finishing mills; a 24-inch sheet bar mill, cold drawing and heat treating departments and a record of being the largest producer of strictly alloy steels in the United States. The Central Co.'s annual tonnage runs from 300,000 to 325,000 tons.

The National Pressed Steel Co., which will function in the future as a division of the Central Steel Co., is a producer of hot-rolled strips and plates and finished structural steel joist sections with a present capacity of approximately 100,000 tons annually. The equipment is all modern and includes slab furnaces, annealing furnaces, complete pickling and finishing facilities, electro-driven hot rolling mill with gauge range from No. 15 to one inch, widths up to 24 inches and lengths up to 130 feet, cold-forming steel lumber sections mills, electric welders and other equipment for furnishing steel lumber, finished and painted ready for use.

The Massillon Rolling Mill Co., which also will be operated as a division of the Central Steel Co., brings to the merger 12 hot sheet mills, 16 cold sheet mills, 18 annealing furnaces and complete equipment and facilities for turning out a complete line of sheet steel.

Several new buildings and new machinery were recently added to this property, most of which was put in operation last March. The plant at present produces approximately 50,000 tons of sheet

TRAFFIC IN GOTHAM.

NEW YORK, Nov. 10.—One hundred and fifty-four thousand, seven hundred cars and trucks enter and leave Manhattan daily. The bridge traffic totals 138,900 motor vehicles and the automobiles crossing by ferry number 14,846. The 418,000 persons using motors for entering and leaving the city equal one-third the subway travel and 1½ times the Long Island railroad traffic. Manhattan and Queensborough bridges have the heaviest motor traffic, which at times is as high as 1344 cars an hour. Ninety-five per cent. of the Manhattan bridge traffic is motor driven, and 78 per cent. of all the bridge vehicular traffic is motorized.

products annually and the arrangement is such that an increase of 50 per cent. in production can be achieved without additional buildings or power equipment. The Massillon rolling mill plant was designed and functions especially as a producer of sheets for the automotive industry, though sheets are also produced for metal furniture, enamel ware and the general sheet trade. The gauge range is 11 to 30, widths up to 48 inches and lengths up to 120 inches on the lighter gauges. Complete facilities are available for pickling, annealing and cold rolling.

G. V. McMahan is now associated with the McMahan & Ryan Co., 819 Higgins building, Los Angeles, Cal.

Calcutta to Have Big Automobile Show

**Motor Trade Association Behind
Exhibition—American Cars
to Be Shown.**

CALCUTTA, INDIA, Nov. 1.—The Motor Trade association of Calcutta will hold an automobile exhibition in Calcutta from Dec. 19 to 24 of the current year. In view of the fact that the Prince of Wales is due to arrive in Calcutta on Dec. 24, there is a possibility that the exhibition may continue until the 31st.

The present arrangements call for the erection of 45 buildings especially suited for exhibition purposes, each to be 80 by 20 feet, electrically lighted and with tile roof. If the demand for space warrants, additional buildings will be erected. In addition, there will be an amusement stand and buildings, rest rooms and eating rooms. Each of the exhibition buildings will constitute one booth; but to allow small dealers a chance to display their lines the booths will be sub-divided.

The exhibition will include automobiles, trucks, motorcycles, motor tractors, trailers, tires and a full line of accessories. Participation is restricted to members of the association, but it is thought that other firms may be eligible for participation by becoming affiliated members. Some of the larger dealers have taken over one or two booths and some are communicating with European and American manufacturers, requesting their cooperation.

The dealers representing American firms are particularly desirous of exhibiting cars and sections of automobile engines specially suited for display purposes. (Continued on Next Page.)



This Tractor, Used in an Emergency, Proved as Efficient and Trustworthy as Though It Were Plowing in a Field at Home.

American Road Builders Hold "Get-Together" Dinner in New York

Boost Convention and Exhibition in Chicago Coliseum, Jan. 16-29—Fine Programme of Vital Subjects Being Arranged and Record Attendance Predicted.

NEW YORK, Nov. 12.—The annual meeting and "get-together" dinner of the American Road Builders' association will be held at the Automobile Club of America on Nov. 15. In the afternoon the officers of the association will render their reports and in the evening the dinner will be held, after which the incoming president and other officers for the ensuing year will be installed, followed by speeches by prominent members of the association.

One of the important matters to be considered at the annual meeting is the coming convention and good roads show of the association to be held at the Coliseum, Chicago, Ill., on Jan. 16-20, 1922. The programme committee is now preparing the programme for the technical sessions of the convention and it is expected that by the selection of a comprehensive list of vital subjects to be discussed by prominent road builders, a large attendance of persons from all parts of the country interested in highway development and highway transportation will be insured. Road problems grow more important as the mileage of improved highways increases and as highway traffic grows in volume; and each year state, county and city officials and engineers attend in greater numbers the annual convention of the association, where they find the solution to many of their problems.

At last year's good roads show there

were over 140 exhibits and from present indications this number will be greatly increased at the coming show. In addition

DISPLACES HORSE.

HONOLULU, H. I., Nov. 1. —In Hawaii, the land of the ukelele, the well-known horse has practically been displaced by the motor car. Thousands of passenger cars, trucks and tractors are now in service in these islands and the horse has been relegated to the "has been" class forever, it seems. On the big sugar and pineapple plantations the work is almost exclusively done by tractors and motor-driven plows. This innovation has reduced operating expenses considerably, at the same time accomplishing increased and more satisfactory work. Several of the plantations are now manufacturing their own motor fuel.

tion to the machinery and materials manufacturers who had exhibits last year, many new firms are making applications

for space, thus showing that more generally are manufacturers realizing the value of the show.

The amount of money being expended on highway construction is now greater than that being spent on all other public works combined. The value of road machinery now being manufactured exceeds the total value of all other construction machinery being produced. More than one billion dollars is available in the United States for road construction.

In view of these facts, it follows that the coming convention and good roads show will be the event of the year for highway officials, engineers and contractors, automotive engineers and manufacturers, and persons interested in highway transportation and highway finance. With the present great interest in highway matters and because of the central location of Chicago and the excellent facilities offered by that city, the officers of the association are confident that the attendance of members and delegates will surpass even the record attendance at the convention held in Chicago last year.

AUTO EXPORTS IMPROVE.

WASHINGTON, D. C., Nov. 10.—Pessimism is gradually giving way to optimism in the automotive export trade, and rumors of better sales and increasing shipments can be backed up by actual statements of facts. A cable has been received from Melbourne, Australia, stating in part that "according to present accounts there is going to be a shortage of automobiles."

In South Africa sales are increasing, and the number of unsold cars on hand steadily declines.

Mexico, which has been buying from the United States on an increasing scale, while its sales to this country have decreased, has greatly improved as a market for automotive products. The United States shipped this year to Mexico 4753 passenger cars as against 1955 in the corresponding period of 1920, and 1073 commercial cars, as against 690 last year for the same period.

(Continued from Preceding Page.)

poses. The opinion is general among Indian buyers that the American car is of inferior quality in comparison with the costlier English and Continental makes.

Particular emphasis should be placed on the necessity of equipping cars with magnetos. Not only is the climate of India too hot for the present battery-equipped cars, but the majority of the native drivers have not even a rudimentary knowledge of machinery or electricity, and battery equipment quickly deteriorates. Local dealers in the past have met this condition by themselves equipping American vehicles with magnetos; but continued failure of American manufacturers in this respect in the future must considerably handicap the sales of their cars in India until such time as the manufacturers of battery ignition equipment shall institute service stations in India and follow the same practices as in domestic markets.



The Body of This Unusual Vehicle Is Built of Heavy Steel Both Inside and Out and Is Thoroughly Burglar Proof—It Is the Despair of Thieves.

Prefer American Tire Repair Goods

Norway and Sweden Use Fairly Large Amount of Materials in New Industry.

STOCKHOLM, SWEDEN, Nov. 5.—Tire repairing is freely practised in Norway and Sweden, and American tire repair materials are preferred to any other, according to consular reports from different sections of the two countries. Consul Alban G. Snyder of Christiania, attributes the establishment of the tire repair industry in Norway to the impossibility of importing new tires during the world war, for the first repair shops came into existence at that time. Since then car owners have continued to have their tires and inner tubes repaired, and several repair shops have been opened in different parts of Norway. To safeguard their interests these shops have recently associated themselves in a national organization.

The shops of Christiania use tire repair machinery and equipment imported from the United States, England, France and Germany, the greatest part coming from the United States. Motorists are accustomed to purchasing accessories and making small repairs to casings and tubes themselves. American equipment, patches, etc., for quick repair work or inner tubes are used extensively. American guns, fabrics, cements, accessories and repair machinery have been introduced by importers of automobiles and tires and through the automobile supply houses in Christiania.

Unlike Christiania, where retreading and major repairs are made, Bergen does not have a shop that retreads worn tires. Consul George Nicolas Ifft writes that in the consular district of Bergen and vicinity there are 687 motor vehicles in use. Of these, 228 are private passenger cars, 128 taxicabs, 194 heavy-duty and delivery trucks, and 137 motorcycles. Practically 90 per cent. of these vehicles are of American make.

There are three very small vulcanizing shops in Bergen. They contain machinery of the simplest description. Small repairs are made to casings and tubes, American gums, fabrics and cements being used exclusively. These repair shops are reported to receive frequent offers from British and German factories for the supplying of tire repair materials. However, the superior quality of the American product has kept it supreme.

Consuls Maurice C. Pierce and Walter H. Sholes report from southern and western Sweden, respectively, that tire repairing is generally practised in their districts.

NAMED NEW YORK AGENT.

CLEVELAND, O., Nov. 12.—The Universal Crane Co. announces that George L. Sawyer, formerly sales manager of material handling machinery for the Bar-

ber-Greene Co. of Aurora, Ill., has been appointed to represent it in the New York field in the sale of Universal cranes. His offices are at the Allied Machinery Center, 141 Center street, New York City.

Keen interest in the Universal crane has been shown throughout the territory due to its adaptability to so many types

NEW FORD LINE?

NEW YORK, Nov. 10.—The possibility of an all-Henry Ford railroad extending from Detroit to Mobile, is seen here by railroad men in Ford's statement that he has obtained an option on the Cincinnati, Milford & Blanchester railroad, which gives his Detroit, Toledo & Ironton an entrance to Cincinnati. If Ford obtains title to the Muscle Shoals plant in northern Alabama, it is believed he plans to obtain an all-Ford direct rail connection between Detroit and Muscle Shoals, with a southern extension to Mobile, which will give the automobile manufacturer a direct line from his plants at Detroit to tidewater at the gulf, tapping his West Virginia coal properties, the Muscle Shoals plant and the Birmingham iron and steel districts.

of mountings and its great flexibility and economy in almost all material handling fields.

The big time saving feature this crane possesses by reason of its adaptability for mounting on motor trucks and trailers on which it can be moved from place to place several times as fast as other full-revolving cranes, is one that attracts those who are studying handling costs.



Magnificent New York Offices of Bosch Magneto Corporation of Springfield, Mass.

Open Shop Is Adopted by Merchants

Wage Scale Committee Acts Following Recent Refusal of Drivers to Accept Cut.

NEW YORK, Nov. 11.—The Wage Scale committee of the Merchant Truckmen's bureau has unanimously adopted a resolution declaring for the "open shop" in the trucking industry in New York City, subject to the approval of the membership. The action of the truck drivers at their recent meeting in refusing to consider the demand for a reduction of \$5 a week in wages and the adoption of the 10-hour day were given as the reason.

It is recited in the resolution that the demand for a revision of the wage scale with an increase in the working hours and cut in wages was made in good faith and it is pointed out that the teamsters had put themselves on record as ignoring this proposal and had declared their intention of offering contracts to the individual concerns direct.

It was said that at the general meeting the Wage Scale committee, David Brooks, chairman, would make a report relative to the attempt to negotiate with the union, and lay before the body facts and figures concerning the industry as well as letters from other organizations indorsing the "open shop" movement and promising support.

One of the letters has been made public. This was from the Downtown league, David Robinson, president. It reads:

"The Downtown league, representing more than 4000 business houses in Greater New York, is in sympathy with your efforts to adjust and revise the scale of wages of trucking industry at this port and desires to cooperate in this matter.

"We believe that the open-shop plan is the only recourse left to protect the merchants and secure relief now necessary to meet the present exigencies.

"In view of all this and the need of prompt remedy we shall be glad to aid in your movement."

The membership of the Downtown league includes some of the largest downtown firms employing truck drivers.

Michael J. Cashal, first vice president of the International Brotherhood of Teamsters, said that the union would begin at once to submit individual contracts to the truck owners at the prevailing wage scale and hours. The Merchant Truckmen's bureau is to be ignored in the negotiations he said.

"We feel that we have the situation well in hand," he said, "and that only a very small minority of the employers will oppose us. The existing agreement terminated Nov. 1."

Fenton L. Howard, formerly chief engineer for the B. & W. Manufacturing Co., Chicago, has accepted a similar position with the Western Radiator Corporation, also at Chicago.

To Expend \$150,000,000 on Construction of Highways

Work to Be Done During Coming Year Will Employ Army of 200,000 Men and Large Number of Trucks—Record Results Anticipated.

WASHINGTON, D. C., Nov. 10.—More than \$150,000,000 will be expended during the next few months for road construction, and repairs on more than 7000 miles of highways will be made as a result of joint contributions by state and federal governments, according to officials of the Federal Public Roads bureau. With a nation-wide surplus of labor and falling prices for materials, road building will take on a new and record impetus, officials say. Contractors are at work in virtually every state preparing bids for work projected. More than 200,000 workers can be given jobs during the next 12 months in highway construction. Labor constitutes about 50 per cent. of the cost of road building, exclusive of materials.

Campaigns to stir public officials to the necessity of undertaking road work now and next spring are being staged in many localities by chambers of commerce, automobile associations, farmer organizations and civic groups. Highway construction undertaken now is in line, it is pointed out, with the recommendations of the National Conference on Unemployment, which urges the building of as many miles now as possible to afford work for the jobless.

The permanent commission on economic readjustment left in Washington to carry out the recommendations of the National conference, is keeping in touch with the road campaigns in many sections.

Congress has measures before it calling for contributions of \$75,000,000 to states for road work, to be available where state and local governments appropriate like sums. As a matter of practice the money

"AUTO-INTOXICATION."

PHILADELPHIA, PA., Nov. 10.—From Jan. 1 to Aug. 31, inclusive, 341 persons were arrested in Philadelphia on the charge of operating their automobiles while under the influence of alcohol. Investigations into several cases, where cars were found abandoned in the street, showed the machines were left by men who were under the influence of intoxicating liquors and who were taking no chances of being arrested on that charge. They accordingly left their cars in the streets, with the intention of returning for them when they had "sobered up."

now supplied by the federal government constitutes only 42 per cent. of the total spent, although it is popularly believed that the states match the federal government dollar for dollar.

Road building costs now are less than at any time since 1914, and about 20 per cent, below the maximum figures of 1920. The average cost of highway construction in the United States last year was \$21,000 a mile. For some kinds of road the cost was \$40,000.

More than 27,000 miles of new highway have been constructed in the last three years under the federal appropriation of \$266,000,000, made in 1916.

Approximately \$100,000,000 worth of road contracts were let this year, providing for the construction of nearly 5000 miles. Approximately \$68,000,000 of the federal fund is still available for the new work.

N. A. C. C. MEETS.

NEW YORK, Nov. 12.—Review of the questionnaire returns determined the new type of programme given below for the New York meeting of the National Automobile Chamber of Commerce, Nov. 15 and 16. Two addresses—no papers—all the rest discussion of live questions of the day in the service departments; topics on the programme or others not there that any one wants to bring up so that the meeting will not be "cut and dried," but developed as circumstances indicate what will be most helpful.

PROGRAMME. Parts Session.

Tuesday, 10 A. M.

Address. A prominent automobile official has been asked to tell how he persuaded dealers to put service first and also his conclusions from his recent study of the parts situation. Report of service committee. Topics for discussion. (a) How can we overcome the "pirate" parts evil? (b) Is it better to relinquish our parts service on obsolete models to underwriters? (c) What can be done to reduce the cost of parts to the owner? (d) Should parts prices cover tax and transportation so that owners can purchase parts at list anywhere? Topics suggested from the floor.

Service Policy Session.

Tuesday, 2 P. M.

Topics for discussion. (a) Suggested improvements for standard service policy. (b) Should special adjustments be based on time or mileage? If the latter on what basis? (c) How can we show more consideration for our customer? Topics suggested from the floor.

Service Selling Session.

Wednesday, 10 A. M.

Address by Percy E. Chamberlain. Mr. Chamberlain will present his plea for the flat rate system in selling service. Topics for discussion. (a) Which is better, the flat rate or some other way of charging for service? (b) Can piece work be applied in the garage to advantage? (c) Are service manuals and time studies on repairs by the factories helping dealers to give better service? Topics suggested from the floor.

General Session.

Wednesday, 2 P. M.

Topics for discussion. (a) Should the factory provide facilities for training dealers' service men? (b) Should more information be given owners on making their own repairs? (c) How can we show dealers the sales value of well-organized service? Topics suggested from the floor.

G. W. Hoyt has accepted a position with the Lexington Motor Co., Connersville, Ind.

Fred W. Herman has been appointed aeronautical engineer in the engineering division of the Air Service, McCook Field, Dayton, O.



Sampson Electric Co., Chicago, "Service by the Golden Rule" Exponent, Is Well Known in Industry for High-Grade Work It Does.

**Advances Six Times in
as Many Weeks**

**Crude Oil Takes Another Jump,
Bringing Quotation to \$4 in
Barrel Lots.**

NEW YORK, Nov. 14.—Another advance of 50 cents a barrel in the price of Pennsylvania crude oil is announced, bringing the quotation to \$4 a barrel. This is the sixth advance announced since the close of September, there being five previous advances of 25 cents each. The current price of \$4 a barrel compares with a low price of \$2.25 for the current year, and with a peak price for recent years of \$6.10 reached last year. Other grades of eastern crude oil were advanced from 10 to 25 cents a barrel, the new list prices being as follows: Cabell, \$2.61; Somerset light, \$2.65; Somerset heavy, \$2.40; Ragland, \$1.25, and Corning, \$2.40. The following table gives the current prices of the principal grades of crude oil as compared with other periods:

	Present	Low, 1921	High, 1920	Jan. 1, 1920	Jan. 1, 1918
Pennsylvania	\$4.00	\$2.25	\$6.10	\$5.00	\$3.75
Corning	2.40	1.20	4.25	3.50	2.80
Cabell	2.61	1.11	4.40	3.42	2.70
Somerset, light	2.65	1.00	4.50	3.25	2.55
Ragland	1.25	.60	2.60	1.75	1.20
Lima	2.08	1.58	3.73	2.98	2.03
Princeton	1.77	1.27	3.77	3.02	2.17
Illinois	1.77	1.27	3.77	3.02	2.12
Midcontinent	1.50	1.00	3.50	2.75	2.00
Healdton	.80	.50	2.75	2.00	1.10
Gulf Coast	1.00	.80	3.00	1.50	1.00
Canada	2.88	2.63	4.13	3.38	2.59

As a result of this further advance in the eastern grades of crude oil it is generally believed in local trade circles that further advances in some of the western grades will follow in the near future. Already it is reported that producers in the Wyoming fields are agitating for higher prices on the ground that the present price of 90 cents a barrel in the Salt Creek and Big Muddy fields are out of line with prices quoted for lower grade oils in other parts of the country and also on the assumption that the price is being depressed for the benefit of the big refining companies in that territory.

STILL ACTIVE.

CHICAGO, ILL., Nov. 3.—Information to the effect that the Motor Truck Manufacturers' association had suspended is untrue, according to B. A. Gramm, the head of the organization, who states that the association has merely discontinued its Chicago office, feeling that the activities of the body could be effectively directed by the president and the secretary from their local office.

HAS FEW CARS.

DANZIG, GERMANY, Nov. 5.—The territory of the Free City of Danzig, with some 750 square miles and a population of 350,000, has a total of 561 motor vehicles, according to official records, of

which 490 are in the city itself. Of the 561 vehicles, 447 are passenger cars, 101 are motor trucks or commercial cars, and 13 are autobusses.

No statistics are available showing the imports of motor vehicles into the Free City territory. The vast majority of cars in use are of German manufacture. While most of the better known German makes are represented at Danzig by agents or branch houses, it does not appear that any foreign non-German cars are stocked here. For the present German customs duties and import and export regulations



The Tractor Illustrated Won Out Against 12 Horses in a Plowing Test.

are in force here, but the inclusion of Danzig in the Polish customs territory, set for Jan. 1, 1922, will tend to remove certain obstacles now in the way of competition by other countries.

GOOD MARKET?

MOZAMBIQUE, AFRICA, Nov. 1.—There are approximately 172 motor cars in the province of Mozambique, which

STEEL STATISTICS.

YOUNGSTOWN, O., Nov. 14.—If steel is the "barometer of trade" then times are getting better. Youngstown is a "one-industry town," being given over almost entirely to steel manufacture. Youngstown's steel mill pay rolls for September were \$3,426,002, an increase of \$76,028 over August, which in turn showed an increase of \$26,946 over July. Figures are not yet available for last month, but it is believed that they will show another slight gain. These increases, while not large, are at least encouraging.

has an area of 271,600 square miles. Of the total number of automobiles this city has 150, while the rest of the district of Lourenco Marques is credited with 22. The number of motorcycles in the province is estimated to be about 55, of which 25 are in the city of Lourenco Marques and the remainder in the rest of the district. Lourenco Marques also has 10 motor trucks.

**Detroit Truckmen Have
Organization**

**Will Handle Household Goods
Within Radius of 200 Miles
from City.**

DETROIT, MICH., Nov. 12.—Detroit transfer and warehouse men have recently perfected an organization for the hand-

ling of household goods and freight within a radius of 200 miles with the idea of making this a motor freight business instead of a railroad enterprise.

Several of the members have had considerable experience in the past in moving household goods for long distances from the city. Its possibilities were seen and the new organization formed.

Interested members point out that motor truck moving has every advantage over the freight train, as it is cheaper, quicker, more convenient and does away with much of the danger of breakage.

According to the plans of the transfer members, states Mr. Blake, chairman of the organization committee, an organized effort will be made to handle all household moving within a radius of 200 miles of Detroit.

"It is only a question of time before the motor van will entirely take the place of the freight car in moving household goods with the exception of trans-continental moving and other especially long hauls," he stated. "Within the last year or two the motor truck's full value in long hauls has been amply demonstrated."

"By individual initiation the distance traversed by motor vans has been increased and in each case the utility and advantage of the pneumatic-tired van over the slow and cumbersome freight train has been demonstrated. But to date there has been no effort made to organize this new field. That is what we intend to do."

"Under this plan it will be possible for anyone living in the district comprising the parts of Michigan, Ohio and Indiana, where good roads prevail, to move the motored way. It is our plan to have a complete organization that will take care of the long-distance business in an efficient and economical manner. Arrangements will be made to obtain return loads whenever it is possible.



"Got a devil of a cold," grunted O. M. Vett, as he tilted a bottle of cough syrup preparatory to taking a swallow. "Wish a free-born American citizen could buy something besides sas'p'rilla—might have shut it off before it got into my lungs."

"Where'd you get your cold," I asked solicitously.

Vett smiled as he replaced the cork in the bottle. "I received this ailment while on a truth-telling expedition which netted me exactly \$150," he laughed in his characteristic way.

"Still talking in riddles," I said. "You might elucidate, if it isn't too much trouble."

"No trouble at all," he answered, pushing a box of Stingaree stogies in my direction. "You know I've been playing the farmers for the last month or so." I nodded. "Well," he continued, "latter part of last week I had occasion to go out into the country. Got a tip 'bout a fellow who had a one-year-old ton truck that was absolutely ruined through overloading. Tough proposition, too. Made me want to fight the slick 'salesman' who made the sale."

"Seems this agent got wise to the fact that the farmer had a pretty good cord wood business established that he worked during the winter months, so he and another professional pirate got it into their heads that they'd add another victim to the list. They took their one-ton truck—the only size they handled—and paid him a visit. They found that this farmer—a good honest chap if ever there was one—wanted a machine that would take a cord of green wood from his farm to the village—pretty close to 10 miles it was, over rather poor roads. Account of the distance he didn't want to haul less than a cord a trip."

Their particular truck is a pretty expensive make and for a one-tonner it can't be beat when you come right down to cases. But, of course, it wasn't built to handle a cord of green wood. But they told this farmer it would take care of the load—on pneumatic tires at that—and proceeded to put on a standard cord and demonstrate. They were pretty smooth and they made the sale. The farmer paid over his cash and started in to use the machine with the load mentioned. He'd hauled about a week with it when he started to have tire trouble. The upshot of that was he put on solid tires. Well, anyway, to cut a long story short he practically ruined the truck last winter and I wouldn't even give him any allowance for it, it was in such poor shape. But after a good honest demonstration I finally sold him one of my 2½-tonners, which was the

size he should have bought in the first place."

He paused, reminiscently. "That's about all there is to the story," he said, "except that those two salesman hadn't better show up in those green pastures again. There isn't a farmer within 20 miles that don't know the way they 'sold' my friend," he finished.

"So that's what you call a 'truth-telling' expedition is it?" I said. "It certainly shows that truth is a whole lot mightier than lies, in this case, at least. And what is more to the point—it also shows that you can't trim one of those farmers without trimming the whole of them. The salesman has ruined business for his entire organization from the manufacturer down. The company hasn't much chance of making any more sales in that neck of woods."

"About as much chance," grunted Vett, "as a clam has of being flat-footed."

IMPACT FORCE.

Experiments just begun by government experts to determine the destructive effect of impact on pavements and to find a remedy, show some striking results. It is stated that a weight of 7750 pounds on the wheel of a truck moving at a speed of 15 miles an hour, becomes 43,000 pounds in its destructive effect if the wheel has a drop of one inch. Such a drop is very readily caused by any small obstruction or crack in the pavement.

USE MORE AUTOS.

There has been noted a proportionately large increase in the use of passenger and commercial automobiles in Rotterdam in the past few months. The statistical report of the municipality for the first six months of the current year shows that there were 636 pleasure cars in use in the city on the first of January, 1921, which had increased to 730 by the first of July. The number of taxicabs increased from 300 to 340, freight automobiles from 620 to 630, while the number of ambulances remained at three and the number of postoffice cars fell from 51 to 42. The total number of cars in the municipality, according to the police returns, has increased from 1609 on the first of January, 1921, to 1745 on the first of July, 1921. This number is not complete and does not include many cars listed by other authorities, but it indicates the course of the automobile industry in this city in a fairly logical manner.

SOME DIFFERENCE.

Holland has 10,000 motor vehicles, or only one car to every 700 inhabitants. The United States has 10,000,000 motor cars, trucks and motorcycles or one to every 11 inhabitants.

This Wont Help Truck Business Much

Virtually all the surplus motor vehicles, totalling 22,577, turned over by the War Department to the Department of Agriculture for distribution among the various states for road building purposes have been distributed through the Bureau of Public Roads.

These vehicles, consisting for the most part of trucks, are a part of the war materials originally intended for use in France and distributed under the Wadsworth-Kahn bill among the various states, the sole condition attached to the distribution being that they should be used only for road-building purposes.

The total number of vehicles so far allotted to the states approximates 528,000. Up to July 1 last there had been distributed 21,124 trucks and 3229 automobiles. Distribution of the motor vehicles among the various states up to July 1 was as follows:

Alabama	497	Nebraska	510
Arizona	302	Nevada	244
Arkansas	457	N. Hampshire	108
California	690	New Jersey	368
Colorado	422	New Mexico	573
Connecticut	146	New York	1,150
Delaware	62	North Carolina	552
Florida	273	North Dakota	333
Georgia	723	Ohio	899
Idaho	303	Oklahoma	502
Illinois	1,043	Oregon	338
Indiana	652	Pennsylvania	973
Iowa	665	Rhode Island	50
Kansas	692	South Carolina	349
Kentucky	459	South Dakota	374
Louisiana	521	Tennessee	544
Maine	205	Texas	1,337
Maryland	228	Utah	261
Massachusetts	226	Vermont	105
Michigan	743	Virginia	448
Minnesota	642	Washington	346
Mississippi	430	W. Virginia	251
Missouri	760	Wisconsin	521
Montana	443	Wyoming	257

Total.....22,577

ROADS IN NEW MEXICO.

The State Highway commission in New Mexico has launched a big road building programme with six new federal aid projects, one to cost \$46,707.02, a second to cost \$65,505.67, a third \$58,362.87, the fourth \$41,624.73, a fifth \$69,844.49 and the sixth \$74,194.47.

Ralph S. Hayes, formerly transportation engineer for the sales and service departments of the Pierce-Arrow Motor Car Co., Buffalo, has been promoted to the position of assistant truck sales manager of that company.

C. E. Heckel is no longer connected with the ordnance engineering department of the Holt Manufacturing Co., Peoria, Ill., but is now located in Buffalo.

T. A. Henshaw has been made truck engineer for the Wright-Fisher Engineering Co., Detroit. He was formerly engineer for the Wolverine Truck Trailer Co., also of Detroit.

T. Furusawa has joined the engineering department of James Cunningham Son & Co., Rochester, N. Y. He was formerly connected with the General Motors Truck Co., Pontiac, Mich.

Goodyear Six-Wheeler in Record Run

SIGNIFICANT as to what part the motor truck may be called on to play in the nation's transportation problem, at least in short hauls, is the trip just made by the Goodyear six-wheel truck between San Francisco and Los Angeles. The distance of 420 miles was made in 14 hours and 40 minutes, or at an average speed uphill and down of 29 miles an hour. Five tons of freight were carried, mostly tires, tubes and accessories. The best previous time for the distance was made by a 3½-ton truck, which averaged a speed of 24 miles an hour. The Southern Pacific railroad, over a slightly longer route, makes this same trip by a fast passenger train in 14 hours and 50 minutes. The six-wheeler's route was the inside or "ridge" road, via Bakersfield and Fresno, rather than the beach road, which is comparatively level.

The truck had to climb to a height of 1700 feet in the first 27 miles, dropped to 1200 in the next seven, then in the next 40 miles had to make an ascent to 4230 feet above sea level. To get a comparative idea of the significance of this trip, it can be stated that the run from New



This Type of School Body, Is Rapidly Growing in Popularity with Rural Communities of Which There Are 12,000 Using Busses.

School and Bus Bodies

OF THE many companies building bodies for the truck that are especially adapted to school and bus service, the S. Albright Co., 13th and U streets, Sacramento, Cal., makes a type of body that is apparently especially adapted for use in California, differing somewhat in structural details from busses manufactured in the East.

The consolidated school bus shown in

with the open type, making an all-year round bus practical for this class of service.

The chassis of this truck has been extended in the rear only. The spare tire carrier is located under the rear of the body, while the seats are built around inside of the body. A ventilating windshield is fitted at the front.

Travelling Grocery

A NEW branch of trade that is still in its infancy, but is showing remarkable growth for the short time that it has been in existence, is the travelling grocery store which is proving a boon to housewives in many sections.

Bright minds, however, conceived the idea that they could go the chain store and the grocery one better by mounting a special type of body on a motor truck chassis, stock the body with goods commonly sold at the chain stores and be able to get a considerable amount of trade by carrying the goods to the customer. Motor trucks of this type are fitted with every convenience for serving the trade quickly and keeping the goods in the best possible condition. An ice box is usually included in the fittings for such supplies as would be affected by warm weather, other non-perishable goods being displayed in racks attached to the side of the truck top, in such a position that they instantly attract the attention of the purchaser as he enters the "store."



This Six-Wheeler Made a Fast Trip from Akron to the Coast, Thus Demonstrating the Feasibility of the Motor Truck for Long Hauls.

York to Pittsburgh, which is approximately the same distance, can be made by a fast passenger train in 10 hours and 30 minutes. From New York to Montreal, which is 430 miles by rail, it takes 12 hours by a fast passenger train. The trip from Pittsburgh to Chicago, 468 miles, can be made by a fast train in nine hours and 20 minutes. In other words, freight from New York shipped out of Pittsburgh or Montreal in the morning can be delivered that evening at its destination by motor truck only an hour or so later than the express passenger trains arrive.

Based on an average speed of 29 miles an hour, the Mississippi river can be brought within a two days' journey by motor truck of either the Atlantic or the Pacific sea board, providing the progressive improvement of national highways is continued.

The Goodyear truck has recently completed a trip from Akron to Los Angeles.

the illustration is typical of the type used on the Pacific coast and combines the good features found in the closed bus



The Latest Thing in Grocery Stores—What a Difference Between This Modern Way of Getting Table Supplies Compared with Pioneer Days!

TRUCK TALK

TIME WILL TELL.

THIS comment is inspired by the recent stand of the city council of Indianapolis, which has decided to require a bond ranging from \$10,000 to \$20,000, in addition to a license fee in the neighborhood of \$50 a year for each motor bus operated within the limits of that municipality. The ordinance also states that no drivers may be employed who have been convicted of the infraction of certain laws appertaining to traffic as governed in that city. The driver must also be free from physical defects. According to our understanding of the matter a violation of these laws carries a maximum fine of \$300 and imprisonment up to 180 days. Worst of all, and emphasizing the power behind this crippling move, the busses may not operate on streets used by the trolleys.

The attitude of the casualty companies with regard to bonds for motor busses is well enough known to need scant attention from this writer. The representative companies practically refuse to handle business of this nature, as the risk from an accident is such as to make the venture especially dangerous since the bonding company's capital might be wiped out in the event of a serious accident, and there is always some danger that this may be the case.

Obviously, this action can have but one effect, viz., that of driving the motor busses from the streets of Indianapolis, for the time being.

The prophet places himself in a peculiar position. Unsolicited, he offers his opinions and by so doing stands a mighty fine chance of ridicule, since the changes of time, peoples and inclinations are such as to make prognostication a dangerous procedure. This of course accounts for the fact that the good guessers are always in the minority, even as it shows why distinction is vouchsafed the successful. The chances of guessing right are very necessarily limited by attendant circumstances. Nevertheless, we feel sure enough of our ground to hazard a positive statement anent the future of the motor bus, not only in the Indiana city, but all over this great country. It is this: Inside of 10 years there will be no trolley-owning interests to influence city councils in their favor, because the motor bus will

have relegated this method of transportation to a place with the centaur—who as we all know, occupies a mighty obscure niche at the present writing.

TAKE CARE OF THEM.

ROADS in the southwestern part of Missouri are anything but good. Many of them are little better than swamps during a large part of the year and at best are nothing to brag of. Yet these same roads have felt the impress of one old truck's tires for a matter of nine years. This truck—it wouldn't be fair to mention names—was purchased just 10 years ago this coming March and has been in constant short-haul freight service since that time. It has hauled grain from farms to elevators, coal to suburban homes, live cattle to market, and during the spring months of several years has carted bagged fertilizer from freight car to farm. And yet it runs today with never a rattle. True, it gets a bit asthmatic at times and it doesn't negotiate some of the hills in quite the former manner, but it keeps going day in and day out and has never yet failed to deliver the goods.

This vehicle is one of many turned out by a pioneer factory at a moderate price. It uses no fancy accouterments, nor has it more than the average amount of power. What then is the secret of its remarkable performance? Simply this: The man who drives it understands his job and practises the proper amount of caution. For instance, he has never driven the vehicle more than 14 miles an hour. He is very careful in shifting gears. He is always after the machine with a wrench and a long-nosed oil can filled with the very best oil obtainable. He washes it every Sunday morning throughout the year and oftener if he thinks it necessary. The minute there is a suspicion of a rattle he wants to know the reason for it. He finds out and takes corrective measures. This old truck has had nine coats of paint since it left the manufacturer's hands. It has never had a leaky hose connection nor a dry bearing. And the owner intends that it never shall. As for overloads—they don't exist in the mind of the stolid Swiss who owns the vehicle.

Now for the moral of this tale. It is this:

Practically every truck built in this country will perform exactly as well as the one herein described, if you give it the proper attention. This idea of a truck "wearing out" and being discarded in three or four years is all wrong and there won't be so much of it inside of another decade.

ONE-TON TRUCKS.

THE increasing popularity of the one-ton truck can be accounted for in many ways. By far the greatest field that presents itself to the attention of the truck manufacturer is that which embraces the delivery of household supplies. Much of this work, in fact the large majority of it, has been done by horse delivery in years past. Now, because of the high price of keeping these animals and, of still greater importance, their recognized inefficiency as compared with the recently developed light truck, they are being done away with more and more and, if the business vehicle continues to improve as it has in the last few years, they will soon be a thing of the past.

To this writer's mind there is no greater opportunity for the light delivery car than that which is presented by the retail delivery field. Another outlet for light truck manufacturers and one to which not enough attention is paid, is the supplying of one-ton motor busses to the consolidated rural schools. It is estimated that there are more than 12,000 communities using this type of vehicle already, and there is every indication that many more will follow suit within the year. The farm demand for the light truck is also very well established, and is opening new avenues to progress as the agriculturist becomes better acquainted with the money-making possibilities of this type of vehicle.

The light truck is certainly the ideal machine for the farmer because it does not destroy the roads and can travel comfortably on many country highways that cannot be negotiated by the heavier type.

It is perhaps significant of the trend of affairs to state that more than half of the trucks produced in this country within the last 12 months have been of one-ton capacity. One might almost deign to forecast that the manufacture of light trucks would one day assume proportions that might well give it sufficient prestige to be known as a separate branch of the parent industry. Certainly no one will gainsay that this end of the business has expanded much faster than any other. It appears also to have stepped into a positive demand, thus doing away with time necessary to create a special niche for its activities.

TAKE YOUR CHOICE.

A REPORT made recently by the gas and oil committee of the American Gas association at the annual convention of the organization said that the United States will face an oil famine which will restrict the use of automobiles and increase the cost of gasoline, unless immediate steps are taken to increase the supply. The committee had made a year's survey of the oil situation. The report declared that a duty on petroleum would curtail shipments from Mexico and greatly aggravate the situation. That doesn't sound very cheerful does it? But read what another great authority says on this interesting subject, Good reading, you'll say but not conducive to sound conclusions.

"The oil industry can continue to meet all demands made upon it," says H. G. James, secretary and general manager of the Western Petroleum Refiners' association. "It is probably true that never before in the 62 years of the petroleum industry in this country has there been such demand for petroleum for fuel purposes. This is due to three things: A realization that petroleum is not a fleeting commodity, an unquestioned supply of oil, and its convenience and safety. Until recently alleged authorities have insisted that within a given period crude oil would become exhausted," said Mr. James in the current issue of the Mining Congress Journal. "During the war it seemed necessary, in order to spur the 'wild-catter' to go forth and drill, to carry the impression that oil was likely to become exhausted and that every effort should be made to produce enough to win the war.

"Nothing more forcibly illustrates the adequate supply of oil as a fuel than the luminous story told by the record of stocks. In 1914, when the famous Cushing pool was at its height, stocks of crude oil in the United States amounted to 141,500,000 barrels. Since then we have passed through the greatest war the world has ever known, and today we find in excess of 160,000,000 barrels of crude oil in storage, with more great fields in course of development and greater production in prospect than ever before in the history of the industry. The thing the oil industry is worrying over is a market, not a supply. The oil fraternity is afraid of imports from countries where the potential supply of oil is almost unlimited. For a third of a century I have been 'playing' with oil statistics and never have I been more convinced of the ability of the industry to meet every and all demands made upon it than now."

Meets Need of Speedy Delivery

New Traffic "Speedboy", Amply Powered by Continental Red Seal Engine, 22.5 Horsepower—Has 1¼ Tons Capacity and Shows Unusual Economy in Operation.

THE Traffic Motor Truck Corporation, 5200 North Second street, St. Louis, Mo., announces the Traffic "Speedboy" as something new in speed trucks. It is designed for the speedy delivery of loads up to 3000 pounds. The outstanding feature of the "Speedboy" is the striking combination of sturdy construction with graceful lines, and it is stated, it lives up to its name.

The Traffic Motor Truck Co. claims superiority for the "Speedboy" because standard units are embodied in its construction, and that every unit has been time tested and found to deliver service with credit to itself. The units are known and accepted as standard throughout the automotive industry and include the following: Red Seal Continental engine, Bosch magneto, Covert transmission, Gray & Davis starting and lighting system, Russel internal gear rear axle, Timken roller bearings, Detroit steel springs, Fisk tires.

THE "Speedboy" is amply powered by a Red Seal Continental Model N4 engine having a bore of 3¾ inches and stroke of five inches, developing 22.5 N. A. C. C. horsepower with a maximum engine speed of 2000 revolutions a minute. A large three-bearing crank shaft takes the power from the engine cylinders and delivers it through the Covert clutch to the Covert transmission. The engine is suspended in the chassis frame at three points, two in the rear and a single point at the front through a trunnion bearing, which allows for frame stresses. The engine equipment includes a Carter special automatic carburetor with gravity feed from the pressed steel fuel tank under the driver's seat, having a capacity of 12 gallons.

Ignition is furnished by a Bosch high-tension magneto fitted with an impulse starter, while the cooling is accomplished by the thermo-syphon method using two-inch inlet and outlet connections between

the radiator and engine water jackets, the latter being of unusual size to give sufficient capacity to the surfaces to be cooled, such as the engine cylinders, valves, spark plugs and the heads of the combustion chambers. The radiator is of cellular type, enclosed in a four-piece, cast-iron shell, cooling amply at all temperatures and altitudes.

The engine lubrication system consists of a combination of force feed and splash, a gear-driven pump supplying oil to the timing gears and main bearings, while other parts of the engine are lubricated by splash.

The Covert multiple-disc clutch is enclosed in the standard S. A. E. bell housing, forming a part of the engine base, and is directly connected to the Covert three-speed selective transmission gear set located amidship. All gears are of three per cent. nickel steel, heat treated and ground. Extra large roller and ball bearings support the main and counter shafts,

reducing friction to a low point. Power is transmitted from the transmission gear set through a two-piece propeller shaft and three universal joints, alignment of drive being maintained by self-aligning roller bearings. This type of construction eliminates vibration and the whipping of the drive shaft.

The Russel internal gear drive rear axle carries the load on a 2¾-inch solid round chrome nickel steel axle. The gears are drop forgings, heat-treated, hardened and ground. The wheels are mounted on roller bearings, while the internal expanding and external contracting brakes supplied with this axle are of more than ample size and strength for the service demanded. The front axle consists of a heavy drop forging with axle stubs fitted with Timken tapered roller bearings. The Traffic steering gear is located on the left, consisting of a worm and wheel type fitted with an 18-inch hand wheel and connected to the front wheels by suitable steering linkage. The gear shift and hand brake levers occupy a position at the driver's right in the center of the floor, while the accelerator for carburetor control is located on the inclined floor. The hand throttle and spark controls are on the steering column under the steering wheel.

Standard Equipment.

The standard equipment includes pneumatic cord tires, 35 by five inches, front and rear; Gray & Davis starting and lighting, explosion whistle, a full set of 16-gauge roll fenders, running board skirts; front splash running boards, speedometer, rain-vision two-way ventilating metal windshield, seat, cowl, full set of tools, chassis painted, striped and varnished.

The wheelbase of the Traffic "Speedboy" truck is 128 inches, the length of the frame back of the seat is 86½ inches, the turning radius 22 feet and the road clearance 12 inches.

Body Dimensions.

The body, included with the chassis, measures eight feet inside from the rear of the seat, 44 inches wide in the clear inside, with panels of ¾-inch gum, 15½ inches high, reinforced with an oak rail

(Continued on Page 614.)



Clean Cut Lines of Traffic "Speedboy" Equipped with Disc Wheels, Top and Pneumatic Cord Oversize Truck Tires, Is Sold at Price Within the Means of the Average Truck Purchaser.

Motor Truck Used As Aid to Knowledge

Travelling Library Brings to Mine Workers Same Opportunities Enjoyed by City Cousins—Is Popular with Readers, Who Welcome Chance to Get Good Books.

THE town of Stuntz, Minn., cooperating with the public library of Hibbing, that state, is engaged in an interesting experiment in Americaniza-

scope views distributed daily. The estimated cost of operation per year is \$4000, including salaries.

The patronage has been surprising.



Inhabitants of Towns, 10 to 20 Miles Distant from Center, Receive Benefit of Travelling Library Mounted on White $\frac{3}{4}$ -Ton Chassis.

tion in which a specially equipped truck is taking an essential part.

Some 20 mining villages have sprung up in the prosperous iron mining territory embraced in the town of Stuntz, their population varying from 200 to 2000 people. These villages are located in some instances 12 miles from the city—a distance too remote to permit the citizens to enjoy the privileges of the Hibbing public library.

The need for library service was recognized, but sufficient funds were not in sight to permit of opening a branch library at each community center. Make-shift locations, manned by volunteers, proved inadequate. The fact that 20 nationalities are represented among the miners and the distribution of English literature to such a large group of potential Americans was almost a necessity, made the situation a puzzling one.

Then some one conceived the idea of the "library on wheels." A fund of about \$8000 was available, and with this a two-ton truck chassis was purchased and equipped with a special body, with book shelves accommodating 1000 volumes, lights, desk, table and magazine racks in-built. Manned by a driver and a librarian, this travelling library now covers 20 stations during the week, in addition to such temporary stations as may be established, such as construction camps, etc. Rural residents along the line of travel are also served, and books, magazines and stereo-

graphs other than English are spoken. The boarding houses in the mining villages are centers of interest in the innovation and the visits of the library truck are eagerly awaited. The farming communities, too, have proved fruitful fields for library extension.

"It is interesting," says Miss Charlotte H. Clark, librarian in charge, "to see people hurrying to the travelling library when the gong announcing the car's arrival is sounded. Men are seen hustling across fields and house wives simply drop everything to surround the library. What one woman said recently is, I suspect, true of many: 'It is an awfully busy time, what with the canning and other work,' she said, 'but I'm afraid when the snow is deep you can't come, and I can't bear to miss the chance for books.'"

"So you see," adds Miss Clark, naively, "the motor truck has a gallant charge ahead of it for next winter, in plowing through the Minnesota drifts."

Gasoline Operated Crane

GASOLINE operated cranes mounted on portable bases and capable of moving from one job to another, are finding daily new fields in which they may function, proving economical and speedy in such work as loading and unloading heavy material, as pig iron, crushed stone, gravel, coal, etc.

Heretofore it has been considered that power to operate cranes of this type should be steam, supplied by a boiler and steam engine. Later types, such as manufactured by the Pawling & Harnischfeger Co., Milwaukee, Wis., are being successfully operated by gasoline or kerosene or a combination of the two fuels.

Cranes so equipped are performing
(Continued on Page 614.)



Gasoline Operated Crane Unloading Pig Iron from Freight Car to Motor Truck by Means of Electro-Magnet.

Brown 22-Passenger Bus Body

THAT passenger transportation between cities of large size and for short-haul distances is on the increase, is amply proved by a few hours' observation in almost any large city. Motor trucks, equipped with passenger bod-

ment consists of a two-piece windshield of the rain-vision type.

Bus Body Has Ample Dimensions.

The body of the Brown 22-passenger bus is 12 feet six inches long back of the driver's seat, 86 inches wide outside

sign, which is particularly pleasing to the observer. The distance from the dash to the back of the driver's seat is 44 inches and it provides ample room for driving operations. The width of the entrance door is given as 25 inches in the clear; the body tapers, from the back of the driver's seat, from 86 inches to 76 inches extreme width over dash. The distance from the front of the bus to the front side of the entrance door is 20 inches and the distance from the wheel housing to the rear of the body is 5½ feet.

The seats are upholstered in rattan, which is considered the most sanitary type, over coiled springs, reinforced for additional strength. They are 32 inches long, 15 inches wide and distanced 35 inches from the floor to the top of the seat back and are 10 inches apart to provide sufficient knee room. The aisle between the seats is 16 inches wide and a full width and seat is provided in the rear, while a short side seat is placed in the front right hand corner.

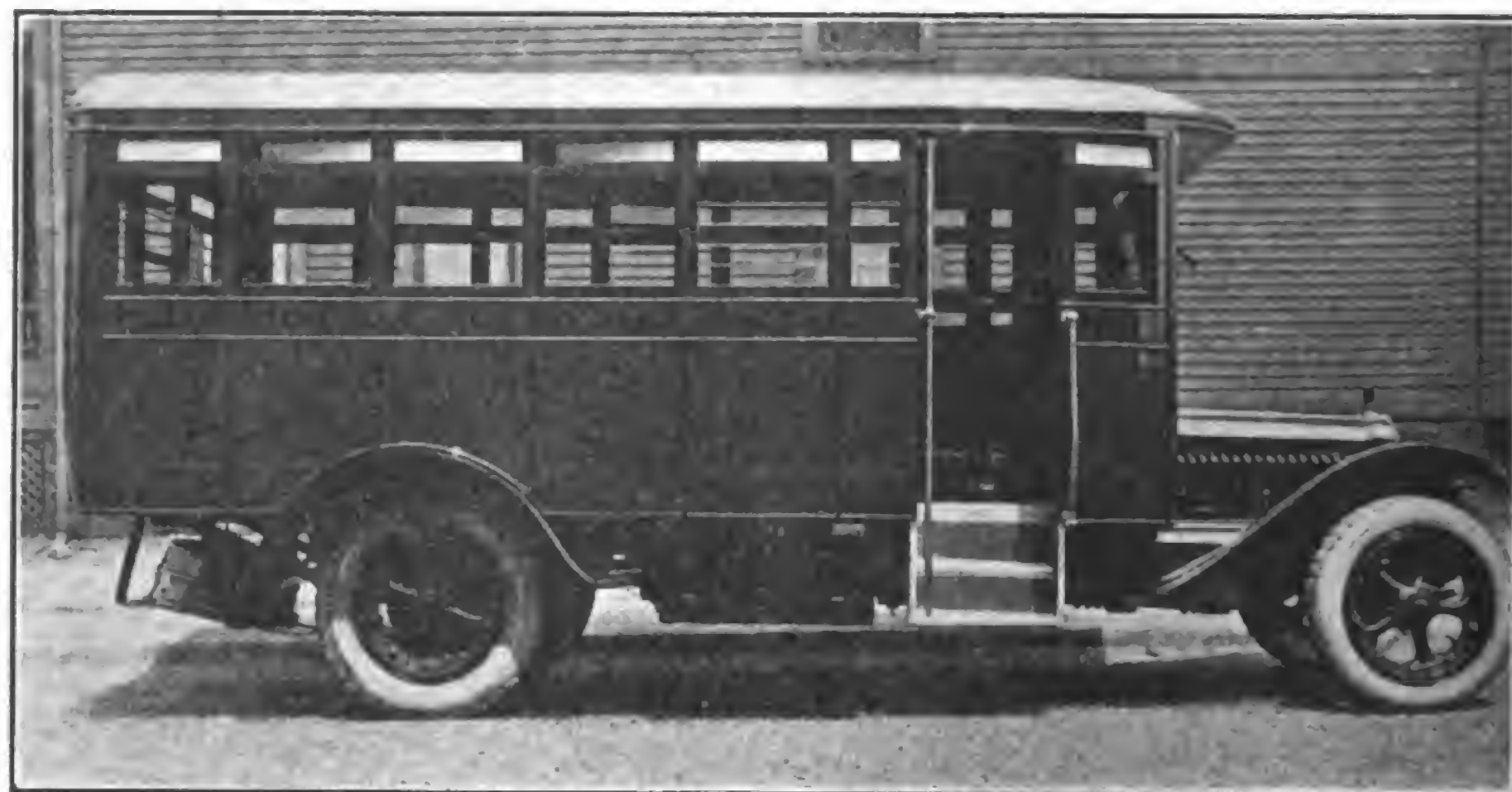
Hand rails are provided at each side of the door, while the step is unusually low to provide for easy entrance and exit. The body is well ironed throughout to provide ample reinforcement at all joints and especially the uprights, U irons being used to bed the cross pieces to avoid body sway. A tool box is provided at each side of the body, one of which is to be used as a battery box container. Fenders are placed over the rear wheels and are of 12-inch gauge iron. Four dome lights are located in the roof back of the driver's seat, two at each side. One dome light is placed over the driver's seat. Each light is operated by a separate switch. Two lights are also provided in front of the bus near the roof, one green and the other red, to denote the right and left hand side of the bus at night.

The wheel housing is provided with clearance for 40 by eight-inch pneumatic tires. A tire rack is placed at the rear underneath the body and chassis, having a capacity of one 40 by eight-inch tire and one 36 by six-inch tire.

All of the body panels are of heavy aluminum sheets, which tends to lightweight construction, at the same time combining strength and rigidity. The body painting consists of a priming coat for the wood work of lead and oil to prevent dampness and the finish colors are chrome orange body trimmed with black and the chassis black with the exception of the wheels, which are orange to match the body.

ISSUES CATALOGUE.

The Oliver-Barth Jack Co., Milwaukee, Wis., a new corporation which recently succeeded the Oliver Manufacturing Co. of Chicago and the Barth Manufacturing Co. of Milwaukee, both of which have been making jacks for 30 years, has just issued its first catalogue illustrating its combined lines. The catalogue is a booklet of 12 pages which the company describes as a "convenient reference book on jacks," illustrating jacks of various types and sizes, including the well-known Peerless for Fords and other pleasure cars, Barth truck and heavy-duty jacks up to 10-ton capacity as well as others.



Brown 22-Passenger Bodies Are Fitted with Every Device Which Tends to the Passenger's Comfort, Including Sufficient Light and Ventilation.

ies of both large and small size, are rapidly taking the place of the jitney that proved so popular at first. Large cities like New York are rapidly adopting the idea of the bus for outlying districts not supplied with trolley service and companies are rapidly being formed for their operation.

To meet the demand for bodies suitable for bus work a number of leading manufacturers are endeavoring to design high-grade busses for this service. Among those who have succeeded in designing a practical body which includes all of the essentials of bus work is the Brown 22-passenger body manufactured by the Brown Body Corporation, Cleveland, O.

Every device or fitment that will conduce to the comfort of the passengers has been incorporated, including the item of safety which many seem to overlook in bus construction. Ventilation has been cared for in an effective manner by placing transom ventilators in the upper part of the sides over the main windows.

The construction of the bus follows closely electric passenger car design, many of the fitments of one being used in the other. Electric push buttons are installed on the posts between each window for signalling the driver when passengers wish to alight, while the electric lights are of the dome pattern sunk in the roof, providing a white light for the illumination of the bus at night.

The driver's seat is partitioned from the bus, provided with a window at the top and drop curtain for night operation. The passenger door opens inward and is operated in two sections, folding one against the other, by the operator from the driver's seat, a conveniently arranged handle being provided.

Catches at the sides allow raising and lowering of the windows of the bus as well as those of the driver's compartment. The front window in the driving compart-

ment and six feet from the floor to the ceiling.

The general appearance, as mounted on a White chassis, gives one an idea of its being hung low to the ground. This desirable feature is attributed to the de-

CHINESE MOTOR LAWS.

NEW motor laws which have been recently put into effect in China provide that "a car shall have a very small bell attached to one of the front wheels, and this bell shall be kept ringing all the time so that when pedestrians hear it they may get out of the way. This bell should be half the size of a bicycle bell. All motor trucks shall have rails or iron chains around the cars to insure safety and in case of collision cargo will be prevented from falling and injuring pedestrians. There shall be one licensed chauffeur and an assistant to take charge of each motor car or truck. The assistant should sit behind and keep a look-out when the car turns around, goes backward, enters or leaves the garage. After a person is killed by a motor car a wax image of the deceased shall be made and placed in a room and any chauffeur who causes injury to other should be locked up in this room so that he will see the image and feel sorry. This may cause him to repent."

Why Overload?

Truck Wears Longer and Gives Less Trouble If Loaded
According to Manufacturer's Rating—Question of
Ultimate Profits Also a Consideration.

OVERLOADING the truck is considered by many authorities a greater cause of inefficiency than any other one item of motor truck operation, because it brings on troubles that eventually mean extensive repairs. The truck as designed and built by the engineering department of the manufacturer, is so proportioned for its capacity that it provides a sufficient margin of overload to take care of the greatest strains which the truck may encounter in its daily work under normal conditions. Trucks are capable of standing an overload for a certain period of time, but when this time is exceeded or the load carried is too great, trouble develops which calls for repairs and their consequent expense. This expense is figured into the operating cost and the owner does not receive as adequate returns for the money invested as he would if he kept within the rated capacity.

QUOTING Hans Jorgensen, an Illinois farmer, who has owned a one-ton truck for two years, he states that he would not pay \$50 difference between the machine which he has and a new machine. He feels that his success with a truck is due principally to his method of handling it. What Mr. Jorgensen has to say about trucks should be of value to everyone interested in this method of farm haulage.

Mr. Jorgensen's farm is a little larger than the average, but a greater part of it is in grass and pasture. He has 396 acres, of which 60 acres is in corn, 75 acres in small grain, 127 acres in grass and the balance in pasture. He felt the need of a truck and after he had used it for a few weeks was not sure that it was a success, but now he would not be without it. "It is on the long haul that the truck serves me best," said Mr. Jorgensen. "I use the machine only for road haulage. On a three-mile haul I can move as much as two teams and two men; for longer distances there is a greater advantage in favor of the truck. This is due to the fact that the teams become more fatigued on long hauls. It is the starting and stopping of the truck on short hauls that reduces its efficiency."

According to Mr. Jorgensen, the temptation to overload is greatest when the farmer is hauling for his neighbors. "If you are hauling grain for your neighbor and the box is not quite full, and he urges you to fill it up and make a real load, you feel as if you might just as well put on a little more, for you know that the machine will carry it, and then you can receive the same pay as the fellow with the larger profit. I have read and reread my instruction book very thoroughly and it warns very explicitly against overloading," continued Mr. Jorgensen, "and when I am tempted to overload I put the temptation aside, for I know the life of my truck is at stake. I think a man is a fool to overload his machine just to please his neighbors, or to be able to haul a little more in a day. The wear and tear on the machine and the result of a single accident will take all you make extra for repairs and your time is lost as well."

"Trucks are built to withstand some overload, the manufacturer referring to

this as the factor of safety. It might better be called the factor of ignorance, for the additional strength of the truck is expected by the owner to support the additional load put on it due to ignorance. Although a truck may be carefully designed and conservatively rated at a certain capacity, with a large factor of safety, it does not mean that it will carry a 50 per cent. overload without damage to the truck. Because the manufacturer claims that the truck will carry 50 or 100 per cent. overload is no reason the load should be placed upon the truck. This should be considered as reserve strength and corresponds to the ability of a horse to pull 50 per cent. more overload on a grade. The man who is used to driving horses would be foolish to keep them under a constant strain all the time, such as they would have on the worst part of the road. The same principle holds equally true of a motor truck.

Overloading Shortens Life of Engine.

"Overloading the truck beyond its rated capacity not only shortens the life of the power plant and the units of the chassis,

but also greatly increases the wear and tear on the entire machine, shortening its life and soon runs up a repair expense that is appalling. A greater strain is brought to bear on the axles, the bearings and the wheels as well as the tires. The effect of the overload on the springs can be easily seen because the deflection of the springs varies with the amount of the load. Overloading soon results in a broken spring if no greater damage. The frame is put under the same strain by overloading as the springs and axles, and if the road is rough it is liable to be sprung out of shape. Overloading has a very serious effect on tires, resulting in the breaking of the inner plies of fabric and in rim cutting when pneumatic tires are used or, if solids, in cutting the rubber away in large pieces and squashing the tire out of shape. The carrying capacity is specified in the guarantee on most truck tires and an increased load either on the truck or on a trailer requires greater traction, which is detrimental to the tires. Larger tires should be provided when an additional load is



Three and One-Half-Ton Truck Heavily Overloaded—Continued Practice of Abuse in This Manner Shortens Life of Truck.

carried constantly. Overloading damages the brakes on a truck as much as any other unit. We can better realize the effect of the overload on the brakes if we try to stop a heavy moving body and then try to stop a light moving body. To stop a heavily loaded truck quickly the brakes are put under a heavy strain. It is often said that the brakes are the most important part of a truck. In case of an emergency it is essential that the brakes hold, as most accidents are due to the driver not being able to stop rather than not being able to go ahead. A person who is used to driving a truck that is loaded lightly must observe extreme care in handling the same truck when it is heavily loaded. It must be remembered that it cannot be stopped as quickly and more pressure must be applied on the brakes.

"The engine of an overloaded truck is naturally under a continuous strain. There is greater wear in the bearings and a greater strain on the connecting rods and the crank shaft than was intended by the designer. An overloaded engine will soon overheat and pound; it is often operated at a higher rate of speed than intended and serious damage is the result. Under such conditions as these it must be given more attention, requiring more lubricating oil and more cooling water to keep the engine working properly."

Overloaded Truck Continually Climbs Hill.

It has often been said that an overloaded truck has much the same effect as making the truck climb a continuous hill. The difference, however, is that the gear ratio for hill climbing would not be selected; the driver would use the particular gear ratio to which he is accustomed for the particular road conditions. This would result in increased wear on the transmission gear box gears.

Overloading trucks by most farmers, according to Mr. Jorgensen, is due to the fact that many have made a mistake in selecting a machine of too small a capacity. The man who owns a one-half or three-quarter-ton truck is very liable to overload it. Usually the bodies and racks for these small trucks are made too large for the capacity, which often leads to overloading. Light trucks would last much longer and give better service if more owners of small trucks were willing to buy larger trucks.

"I do not make a speed wagon out of my machine. Speeding is just another way of overloading," continued Mr. Jorgensen. "In fact, speeding does much greater damage than simply overloading." A cautious driver might overload; it is usually the careless driver who speeds. Speeding makes the road shocks more violent. It is the law of physics that the energy of a moving body increases as the square of its velocity. In other words, when the velocity is doubled the energy developed is four times as great. It is for this reason that a jolt caused by a rough place in the road is so very destructive when a truck is speeding; thus speeding causes the strain on all parts of the chassis to be greatly increased. The added vibration of a truck that is speeded is quite noticeable,

FARM TRUCK SURVEY.

PONTIAC, MICH., Nov. 9. —That the farm truck follows the farm dollar is shown by the farm market survey made by the General Motors Truck Co. In states where the value of farm crops per farm is highest, the greatest percentage of farmers own trucks, regardless of road conditions and other influences. The average value of farm products for the United States in 1920 was \$2900 per farm. Nevada farms topped the list with an income of \$10,378 per farm, while Mississippi ranked last with \$1101 per farm. Seventeen states ranked above \$4000 per farm, Nevada, Wyoming, Arizona, Iowa, California, New Jersey, Nebraska, Kansas, Massachusetts, South Dakota, New York, Illinois, Rhode Island, Connecticut, Vermont, Colorado and Oregon. These are, peculiarly enough, almost the identical states in which are found the 17 highest percentages of trucks per farm. This survey was made that the General Motor Truck Co. might ascertain the most immediate farm market for its model K-16 one-ton truck, which was recently reduced \$500, the new price being \$1495.

especially when it is equipped with solid tires; but with pneumatic tire equipment some of the road shocks are absorbed, but not all of them, with the result that vibration is noticeable. It is this great vibration that soon racks the truck to pieces.

Overspeeding is also more destructive to the roads and to the tires due to the increased blows on the surface caused by ruts. The impact of a slow-moving vehicle is slight when compared with a high-speed machine. There is not only greater wear and tear on the tires, but the speeding causes them to overheat, which is also detrimental. A speed of 10 miles an hour might be considered slow on country roads and reckless speeding under city traffic conditions. For this reason the man who drives part of the time on good smooth roads must be doubly cautious when driving over rough country roads.

Bearing in mind that Mr. Jorgensen's truck is practically as good as the day he bought it, after two years use and at no cost for repairs, the value of not overloading, nor speeding, and of following the instructions of the manufacturer in taking care of his truck can be appreciated.

If Mr. Jorgensen had kept an accurate account of his operating expenses during the two years he has had his truck, his story might be more complete.

NEW BOOKS.

Among the new books of the month of interest to motorists, repairers and others, is the Automotive Repair Book, Vol. 1, by J. C. Wright, who for many years was chief of the Industrial Education service, Federal Board for Vocational Education, and formerly educational director of the Rahe Auto and Tractor school, Kansas City, Mo. Mr. Wright is also a member of the Society of Automotive Engineers.

The book consists of a manual of repair jobs for the general repairer, owner or class room, and includes descriptions of and full instructions for doing every common automotive repair job. It also embodies the principles of construction and operation, including gas engine mechanics, as applied to automotive equipment.

In all, 118 repair jobs are described, showing the methods of procedure in making the repair, the tools required and the correct methods to follow in assembling. Reference is made frequently to the mechanical section, which fully describes the mechanism of the units.

The Automotive Repair Book is published by John Wiley & Sons, 432 Fourth avenue, New York. Price, \$3.50 postpaid.

The Auto Data Book, edited by G. T. Simonson and published by the City Editor Publishing Co., Inc., 15-21 Park row, New York, N. Y., price, \$3, is a complete list of passenger cars manufactured from 1913 to 1922, giving complete specifications, serial numbers and model numbers or symbols for each year, together with current prices and used value for the various years.

The volume is very complete and should prove of value to motorists, dealers, repairers and others in the industry who frequently find it necessary to seek the kind of knowledge given.

Several pages are given over to technical specifications of the various units used in passenger cars, while other pages describe the common troubles of cars and how they may be remedied.

HAYES EASTERN SERVICE.

JACKSON, MICH., Nov. 10.—The Hayes Wheel Co. has established, at 250 West 54th street, New York City, a branch of their service and sales for the purpose of supplying the eastern territory and export division with the complete line of Hayes wheel products.

The big demand in the East for the new demountable at the rim wire wheel is the reason for the early establishment of the New York branch.

Donald Ganiard will leave the general offices of the Hayes Wheel Co. of Jackson, Mich., to take charge, and will be assisted by L. J. Curry, formerly with the Sales & Service Co. at Philadelphia as sales manager, and F. R. Symonds of the sales and service division of the Hayes Wheel Co. at the home plant, to be in charge of stock, shipping and receiving. This insures the eastern territory and export customers an "A Number One" service.

Buffalo Man Plans a Long Truck Tour

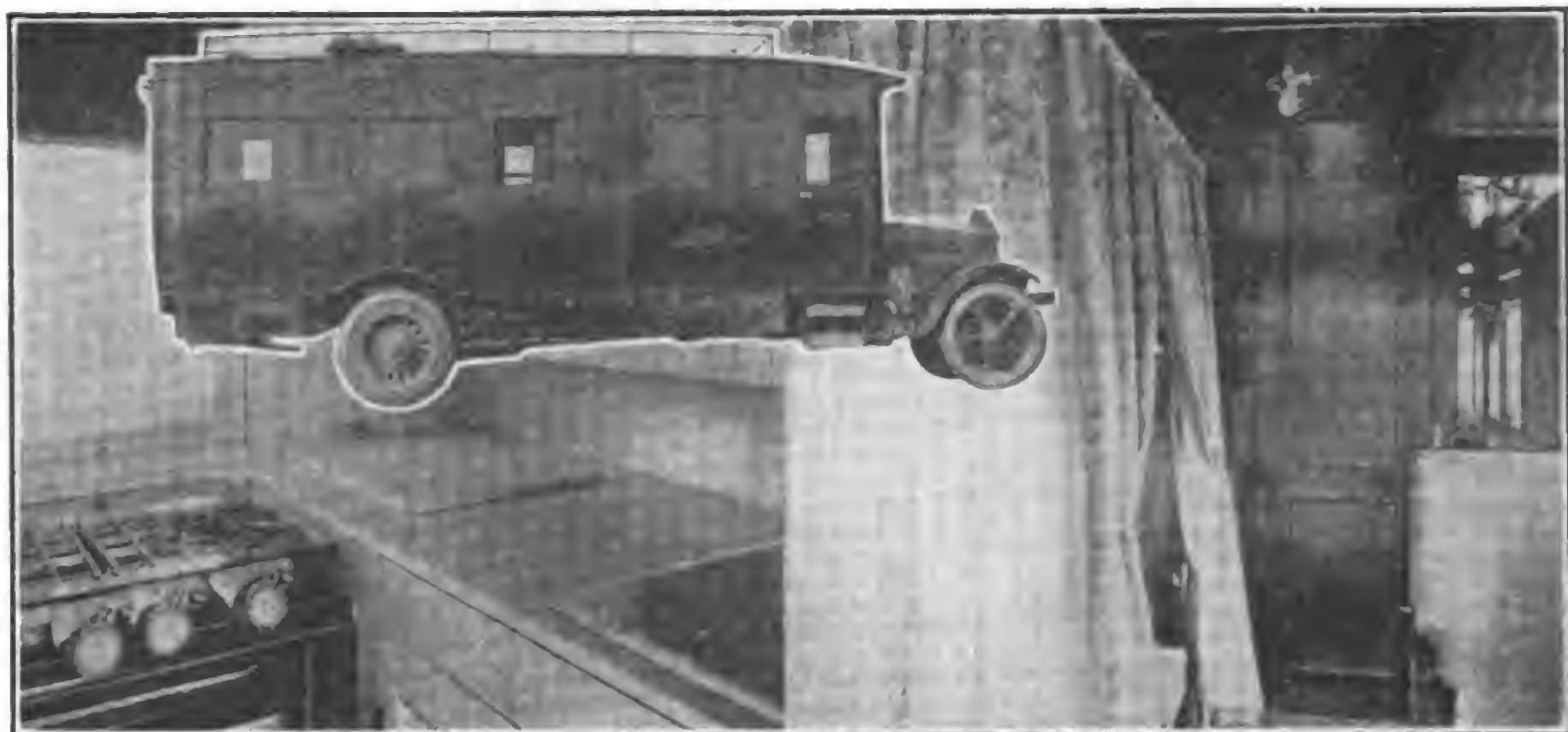
ANDRE BOUTIN, aged 77, retired merchant, has determined to spend the rest of his life seeing America. With this purpose in view he had constructed what is perhaps one of the most elaborate and complete "touring houses" ever designed.

The body, which is 22½ feet long, is mounted on a five-ton Pierce-Arrow Dual axle chassis. It is 7½ feet wide and its roof is 10 feet from the road bed. The interior approximates the luxuriousness of a private railroad coach. The driver's compartment has a combination seat and bed. An aisle runs from the driver's compartment to the spacious quarters in the rear of the "house." Off this aisle are two compact "rooms." The first is a bath room, in white enamel with modern plumbing fixtures. The next is a kitchen fitted with a gasoline stove, electric grill, sink, refrigerator, hot and cold water and cabinet. In the rear is the combination living and sleeping room, fitted with four berths, Pullman style. All the windows are of French plate glass, fitted with copper screens. A porch slides from beneath the body at the rear and may be covered with an awning. The interior is heated by exhaust steam and also by electricity. An auxiliary generating and water pumping outfit provides current for the lights and power for the filling of the big water tanks.

Mr. Boutin started recently from the Pierce-Arrow Motor Car Co.'s factory at Buffalo, with his new home on wheels, for the South and, during 1922, plans to make a leisurely journey across the United States. Mr. Boutin carries a party of four persons with him.

Designed Specially for Mountain Service

AS A general rule motor trucks are expected to perform over any kind of road or grade with credit to themselves and it is not often that one finds a company located in a mountainous section making a line of trucks especially designed to meet grade conditions found in a mountainous country, but such is the



Touring Home of Syracuse Retired Merchant Who Decides to See the Country While Enjoying Comforts of Home.

case with the Kearns truck manufactured by the Kearns-Dugie Motors Corporation, Danville, Pa., located in the Allegheny mountains.

It was early foreseen by the company that its production would be sold to a large extent locally, and with this in mind it set about designing trucks that would successfully meet conditions as found in this section. This required careful selection of units of proven worth made by responsible manufacturers of long standing and even after this important item had been settled it remained to test the finished trucks under average local conditions. The trucks were driven over roads which they would be called upon to negotiate under working conditions, loaded to capacity to try their staying powers and power development. Weak units when detected were eliminated as soon as found, by supplying new ones of other manufacture until components were found which would perform satisfactorily.

Trucks were thus developed which embodied unusual staying qualities, great power and rugged construction which place these trucks in a class by themselves. Constructed originally for home trade their fame has spread to other parts of the United States where similar conditions prevail with the result that the company is planning to increase production materially during the coming year following out the tried policies formulated in building the first models.

All units are of well known manufacture, such as Hershell-Spillman engines, Zenith carburetors, Berling magnetos,

Pierce governors, Borg & Beck clutches, Dyneto two-unit starting and lighting systems in the one-ton trucks, Grant-Lees three-speed transmissions, Spicer universal joints, hollow nickel steel propeller shafts, Torbensen internal gear drive rear axles fitted with Powerlok differentials and Timken tapered roller bearings throughout.

The frame and springs are of special steel which will withstand hard usage without showing fatigue of the metal, while the Hotchkiss drive cares for the turning torque of the rear axle. Unit construction is used, the engine, transmission and clutch being integral with the engine, which provides for the accessibility of these units and prevents misalignment.

The models are made in two sizes, model H 2000 and model N 3000 pounds capacity respectively. The smaller model is mounted regularly on cord pneumatic tires, while the larger is equipped with solid tires regularly with an option of pneumatic tires if the customer wishes.

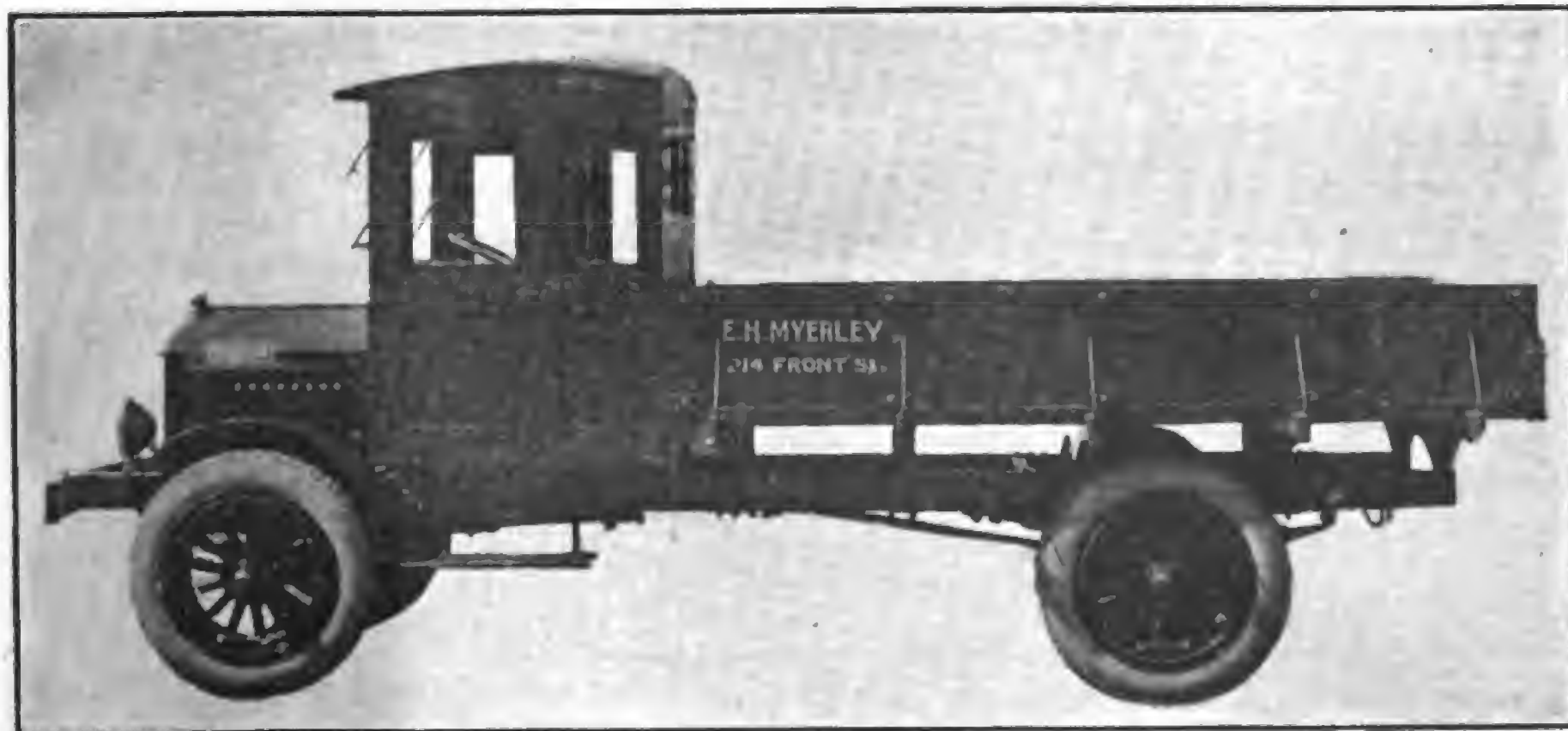
The wheelbase of the one-ton truck is given as 118 inches and of the 1½-ton truck, 136 inches. Price, one-ton chassis, \$1600; with express body, \$1825 f. o. b.; 1½-ton chassis, fully equipped, \$2200.

SPECIFICATIONS MODEL H ONE-TON.

Engine—Hershell-Spillman.
Bore—3½ Inches.
Stroke—Five Inches.
Horsepower—S. A. E. Rating, 19.6.
Carburetor—Zenith.
Ignition—Berling.
Governor—Pierce.
Starting and Lighting—Dyneto.
Cooling—Thermo-Syphon.
Clutch—Borg & Beck Plate.
Transmission—Grant-Lees.
Rear Axle—Torbensen Internal Gear.
Bearings—Timken Taper Roller.
Wheelbase—119 Inches.
Tires—32 by 4½ Inches Front and Rear.

SPECIFICATIONS MODEL N 1½-TON.

Engine—Hershell-Spillman.
Bore—3½ Inches.
Stroke—Five Inches.
Horsepower—19.6 S. A. E. Rating.
Carburetor—Zenith.
Ignition—Berling.
Governor—Pierce.
Cooling—Thermo-Syphon.
Clutch—Borg & Beck Plate.
Transmission—Grant-Lees.
Rear Axle—Torbensen Internal Gear.
Bearings—Timken Taper Roller.
Wheelbase—136 Inches.
Tires—36 by 3½ Inches Front, 36 by Six Inches Solids, Rear.



Danville, Pa., Company Builds Rugged Trucks for Mountain Service—Standard Units of Proven Value Form the Assembly.

Hunting Electrical Troubles

Defects in Wiring System Easily Traced by Truck Driver Who Will Study Wiring Diagram and Follow Instruction Book Issued by Manufacturer.

(By WILLIAM DEVLIN.)

HOW often one notices motorists and drivers of motor trucks stopped along the road, because of some minor electrical trouble, trying to straighten out the difficulty so that the cars can again be put into operation! These electrical problems cause more bother to car drivers and truck operators than any other class of mechanical defects for the simple reason that they are the least understood and often, when repairs or adjustments are attempted, the trouble is made worse instead of rectified. Many owners have no idea of the function of the battery, wires, switches and other components of the electrical system and are at a loss to know just how to proceed to locate and remedy these defects. In tracing electrical troubles the start should be made at the storage battery, as this is the source of the electrical current for operating the various units.

THE battery is kept charged by the generator, to be sure, but current is drawn from the battery for the operation of the starting motor, lights, horn, ignition and other smaller auxiliary units.

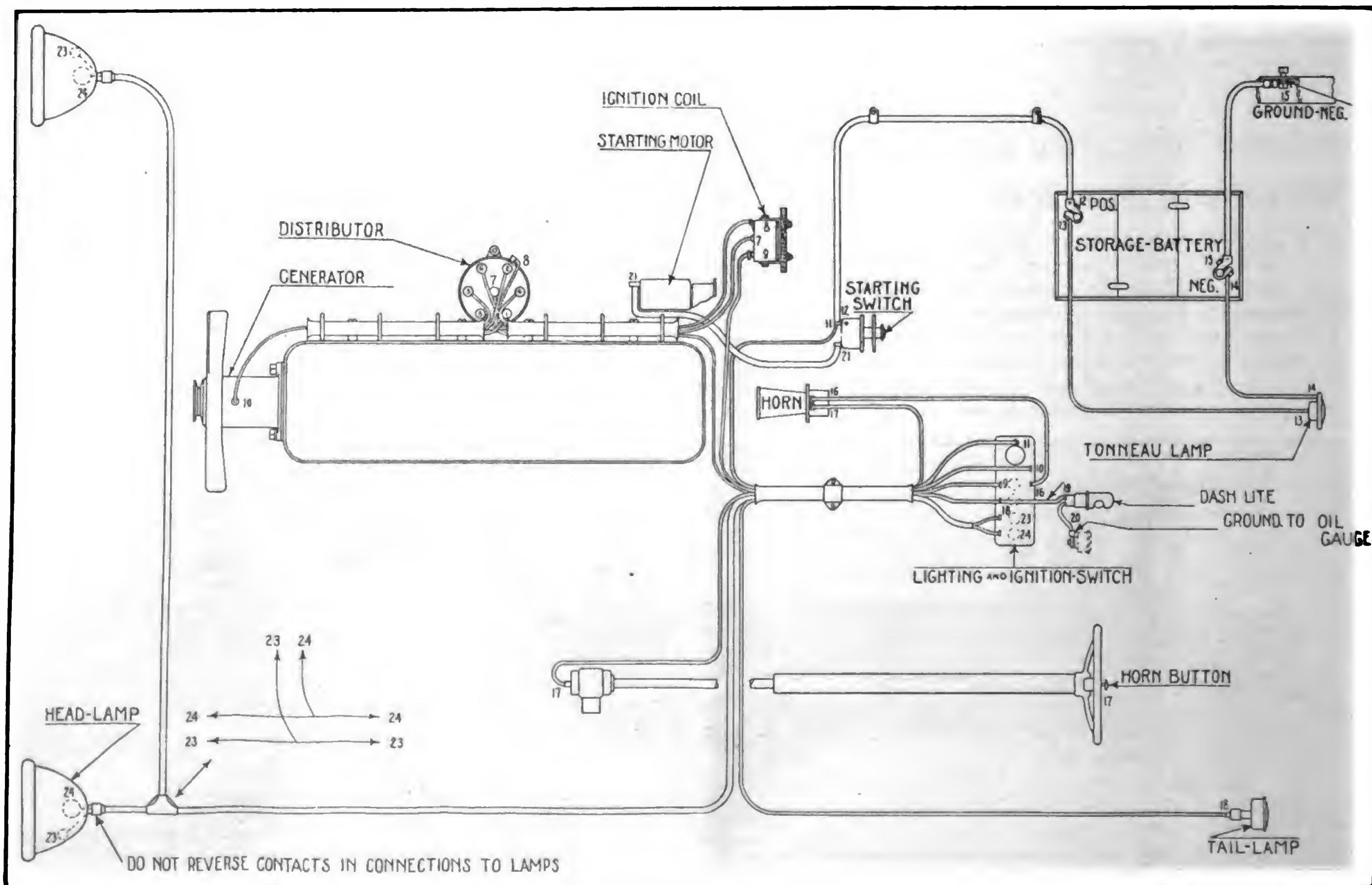
The battery is fitted with two end posts, marked respectively positive (Pos.) and negative (Neg.). Large terminal wires are connected to the posts by clamps which take the current from the battery on the positive side and return it to the negative side after it has performed its work at the starting motor. These connections may become loose, coated with verdigris

or corrosion, which will prevent the passage of the current only in small amounts. In this instance the lights will burn dim when turned on, the starting motor will turn over slowly and, if the condition is too far advanced, the motor may not turn.

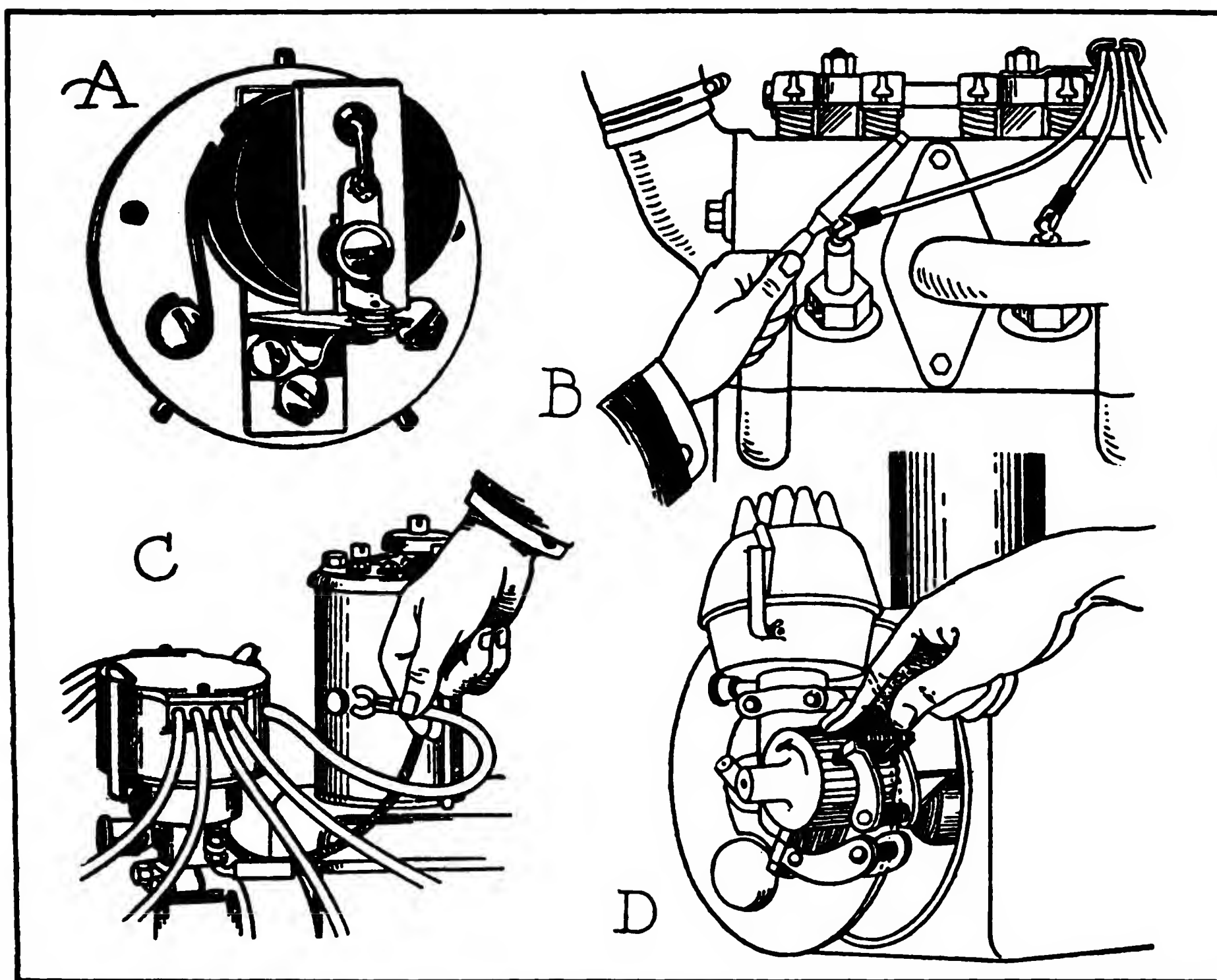
The terminal wires and clamps should be separated, if corroded, cleaned with fine sandpaper and the surfaces and interior of the binding clamps coated with vaseline to prevent a recurrence of the trouble.

The large terminal wires lead from the battery to the starting motor, completing the circuit through the starting motor button and in some cars the second wire

is dispensed with entirely, the current returning to the battery through the side frame of the car. This latter type of circuit is termed a grounded circuit because the motor is grounded to the frame, as is also one of the battery terminals. Some manufacturers ground the negative side, while others ground the positive. Whichever way the manufacturer connects the battery the same method should be followed if the battery is removed and later replaced, otherwise difficulty will be found in operating the car. For instance, the ammeter will read inversely and the starting motor will have a tendency to run in the opposite direction.



Typical Wiring Diagram of Modern Speed Truck—Wire Terminals Indicated by Numbers at Each Unit—Troubles Easily Traced by Following Colored Wires or by Checking Corresponding Numbers.



A, Rear View of Circuit Breaker; B, Short-Circuiting Spark Plug to Detect Missing Cylinder; C, Testing Spark at Ignition Coil (Lazy Coil Often Awakened by This Method); D, Sanding Commutator of Generator or Motor to Remove Grease or Scale.

Chafed wires or loose connections at the battery, starting switch, motor or ground connections will cause the motor to fail to operate properly and, if found, should be tightened or repaired.

Lighting, Horn and Ignition Circuits.

In practically all motor vehicles which use electrically operated lights, horn and battery ignition, a wire is led from either the storage battery, if a starting motor is not used, and from the rear of the starting button if a starter is used, which takes the current from the battery through the ammeter to the lighting and ignition switch. The ammeter indicates the amount of current which the units are drawing from the battery on the discharge side and keeps a check on the battery. Loose connections at this instrument will prevent the instrument from functioning properly and should be remedied. Reversing the ammeter connections will cause the ammeter to read incorrectly. This occurs occasionally if ammeter replacement has been necessary. The ammeter should have the connections reversed at the first opportunity so that it will read correctly. If, when the engine is stopped with the lights and ignition turned off, the ammeter still registers discharge, this is an indication that there is a short circuit in some of the circuits beyond the ammeter that should be remedied, as the constant drain on the storage battery, although small, will eventually run the battery down if allowed to continue.

Lighting and Ignition Switch.

The current, after leaving the ammeter, is carried by connecting wire to the switch which controls the lighting and ignition circuits. Loose connections at either place will weaken the current flow, preventing full function of the units. Testing the end of the wire at the switch by short-circuiting the current to the

metal part of the car will quickly determine if the current reaches this unit. If it does, the defect is probably in one of the circuits beyond the switch and should be determined by systematic search. Taking the circuits one at a time they may be traced through to the unit which they operate and the trouble located. Starting with the head light circuit, throw the switch to "on" and note if the lights burn properly. If they do, try the dimmer circuit in the same manner. As the dash and tail lights are on either circuit, they should be examined at the same time to see if they burn properly. If it is found that either circuit does not burn, or that the head lights burn and the dash or tail

light does not, look for the defect in that circuit which is giving trouble.

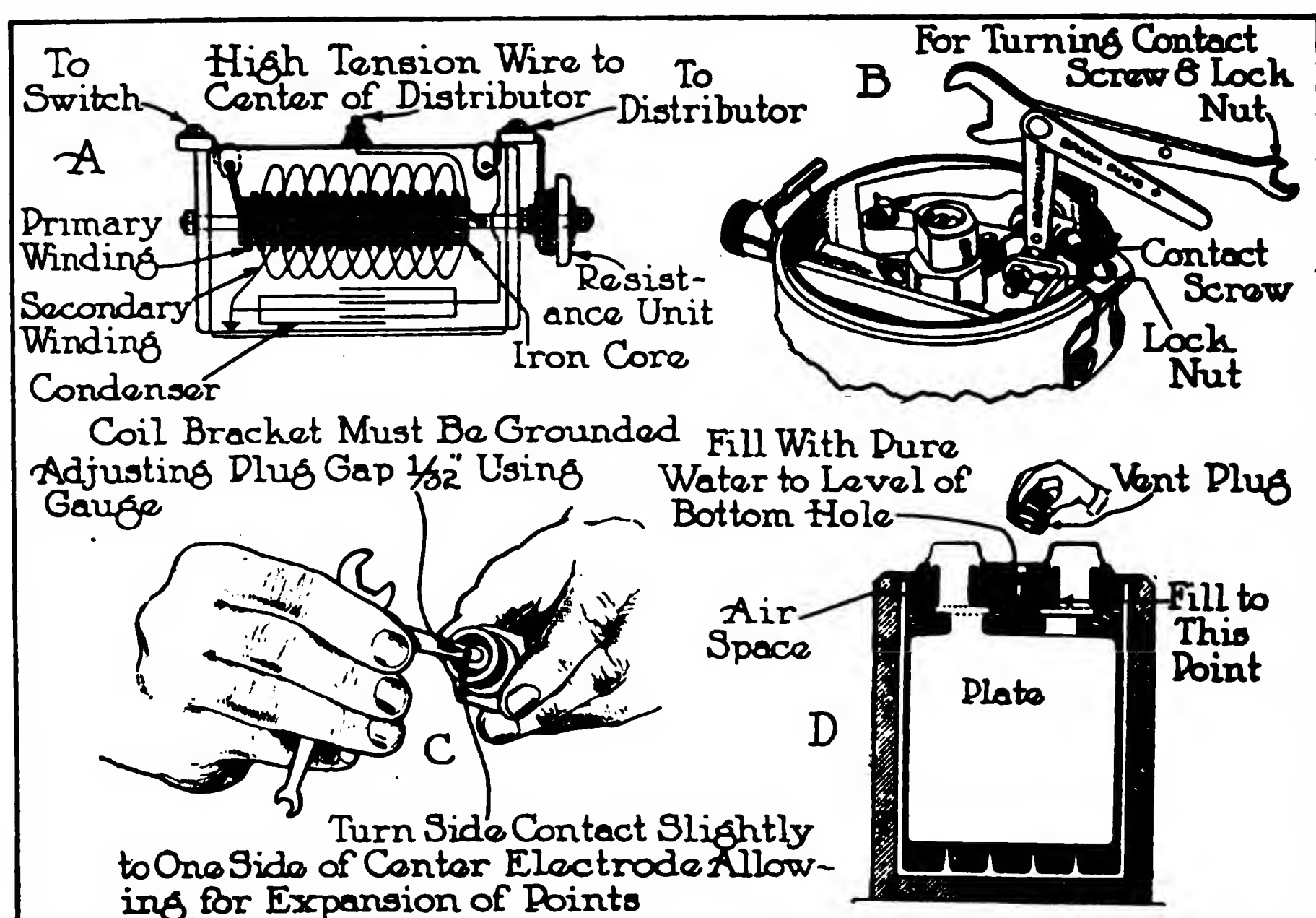
To illustrate the procedure, take the head light "bright" circuit, which connects the large bulbs in that circuit. Examine the bulbs first to make sure that they are not burned out, or that they are not making contact with the sockets. Often it will be found that one or the other of these troubles will be present. Replacing with a new bulb or making better contact with the socket connector will remedy the defect.

Fuse Panel and Fuses.

If the light bulbs are all right and all lights on that circuit fail to burn, the trouble is in the fuse panel. A fuse is probably burned out, causing an open circuit. There is a cause for the burned out fuse and diligent search should be made to discover it before putting in a new one. It may be occasioned by crossed wires, a chafed wire resting on the metal parts of the car or a small wire connection in the lamp socket, which causes a short circuit. Often in making connections at the lamp sockets a strand of wire projects to one side and is overlooked; this wire, coming in contact with the lamp socket, causes a short, which will blow the fuse.

Having located the short and repaired it, replace the fuse and test the circuit. If the fuse holds the trouble is found and the circuit will give no further trouble. If it blows, search must be made for further leakage and it is not safe to replace with another fuse until the short is located and remedied.

The same rule applies to cars equipped with a circuit breaker instead of fuses. This instrument is placed behind the instrument board and gives warning of short circuits by a buzzing sound. When heard the operator should immediately look for the trouble and remedy it if possible. It is more difficult to locate defects where the circuit breaker is used than it is when individual fuses are employed, as the circuit breaker controls all of the circuits while the fuse usually controls only one.



A, Sectional View of Ignition Coil Indicating Parts of Unit; B, Showing Method of Adjusting Breaker Points in Breaker Box; C, Setting Spark Plug Points with Gauge Tool; D, Sectional View of Storage Battery Showing Relation of Parts.

Rear and dash lights are usually wired in multiple in the same manner as commercial house lights, and if one burns out the other does not, but will continue to burn. Lights of this type are six-volt, two-candlepower and draw but very little current from the battery.

One or two manufacturers wire these lights in series, splitting the circuit voltage, placing two three-volt, two-candlepower lamps in a six-volt circuit. The object of this is that, when the rear light goes out through accident or natural causes, the fact will be shown by the dash light going out also. Replacing the burned-out or damaged light will remedy this defect.

The use of parking lights, cigar lighters and other auxiliary circuits adds additional circuits to the car wiring, which are tapped into the main circuit back of the lighting and ignition switches so that they are not controlled by either switch, but a separate one either in the light itself or on the dash panel. Defects in these circuits may be located in a man-

ner similar to that described for lighting circuits and will usually be found to consist of short circuits, burned-out bulbs, loose connections and the like.

Ignition and Horn Circuits.

The same rule for tracing defects in the ignition and horn circuits applies as for tracing defects or shorts in the lighting circuits, except that the horn circuit is tapped in back of the lighting and ignition switch and is controlled by the horn button with a fuse in circuit. A blown fuse will put the horn out of business and will usually be caused by a short circuit. Poor or loose connections at the horn button or horn will weaken the tone, while defects in the horn will prevent it from operating. If of the buzzer type, the contacts may need adjusting or cleaning. If of the motor driven type the horn may need oiling, cleaning or brush adjustment.

The ignition circuit supplies the ignition current to the spark plugs through coil, breaker box and distributor. Defects in this circuit which prevent the engine from operating may be caused by a

short circuit due to frayed wires, loose connections, failure of the breaker points to operate properly, burnt-out coil, dirt or oil in the distributor head.

Testing the current flow at the breaker box will determine whether it reaches this point; while watching the breaker points operate will show whether they are opening and closing properly. A punctured condenser will not cause the engine to stop, but will make the breaker points arc and requires replacement to restore it to efficiency.

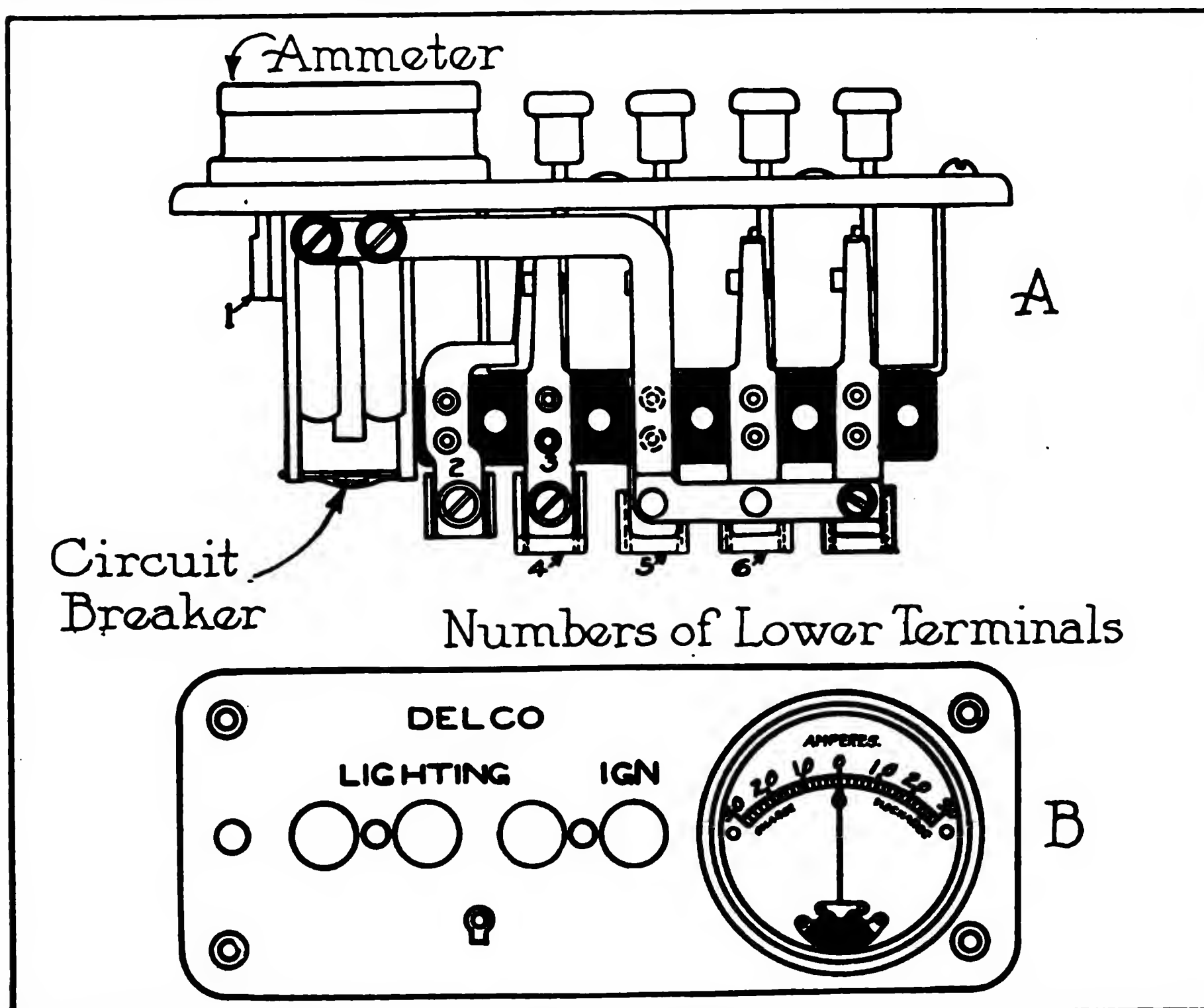
Burned points in the breaker box will cause the engine to start hard and to run irregularly. Replacing the burned points with new will remedy this defect.

A burned-out coil makes itself manifest by the engine stopping and when turned by hand not giving a spark at the high-tension lead at the side of the coil when the lead is separated about 1/16 inch. Sometimes separating the high-tension wire in this manner will "wake up" an otherwise "dead" coil and the engine will run while warm, but will stop again when cold. The spark gap at the coil intensifies the spark and allows the plugs to give a heavier spark than they otherwise would.

Spark plug troubles often occur when least expected and are baffling for the novice to locate. They are, however, easily detected by shorting the plugs with a screw driver and noting which cylinders are firing. Those that are firing will stop when shorted and will cause the engine to run unevenly.

Removing the plug from the cylinder that is not firing will usually show that the porcelain of the plug is cracked, that the plug is filled with oily carbon deposits, or that the plug gap is too great or too small.

The carbon deposit should be scraped out with a pen knife and the points adjusted to about 1/32 of an inch or the thickness of a worn dime. Lay the plug on top of the cylinder after connecting the high-tension terminal wire, and try the plug with the engine running. If a good spark is shown, the plug is all right to put back into the cylinder; if not and sparks seem to jump across inside without coming to the points, the porcelain is cracked, allowing the current to leak. The plug should then be discarded and replaced with a new one or one that is known to be sound.



A, Side View of Delco Switch, Showing Connections; B, Front of Delco Lighting and Ignition Switch, Showing Position of Ammeter.

NAILS AND TACKS.

Frequently when tires are examined it will be found that the cause of a mysterious puncture is a tack or nail point on the inside of the shoe which has penetrated the tube. On pulling out the nail or tack with pliers it is often seen that the tack or nail has been in the casing for a long period and that the head is worn off. After removing the nail or tack the hole in the casing should be filled with plastic rubber compound to prevent water entering and rotting the fabric of the tire.

Such nails may not be noticed on a casual examination of the outside of the tire as, the head being worn off, the rubber tread quickly covers it, and its pres-

ence is not known till the puncture occurs. Often, however, nails and tacks can be located by pressing the tire on the outside with the thumb and finger. Soft spots will show that the fabric is weak and further pressing of the tire will often expose the nail or tack.

SAVE VALVE CAPS.

Don't throw away valve caps. Screw them on firmly and prevent air leakage. The valve plunger, a little mechanism inside of the stem, serves as an air lock during inflation, but the valve cap is the secondary air seal during usage. Tire men advise employing the valve to inflate the tire and using the cap to keep it inflated.

REMOVING HUB WASHER.

The job of removing the wheel hub washer seems often an almost impossible job, but it can be made easy by the use of a simple tool that is readily made by any car owner. Take a pair of round-jawed pliers five or six inches long. File a notch on the inside of each jaw near the end and then reduce the diameter of the jaws until they will just slip into the holes in the ends of the split washer. With this tool it is a simple matter to remove the washer. Just hook the ends of the pliers into the holes, close the pliers to contract the washer and withdraw it from the groove, when it may be slipped out by running the point of a screw driver around the edge.

Special Atterbury for Contractor Service

HERE are the details of a new Atterbury model which should be a money making proposition. These trucks have been designed especially for the use of road contractors and general contractors engaged in concrete construction work.

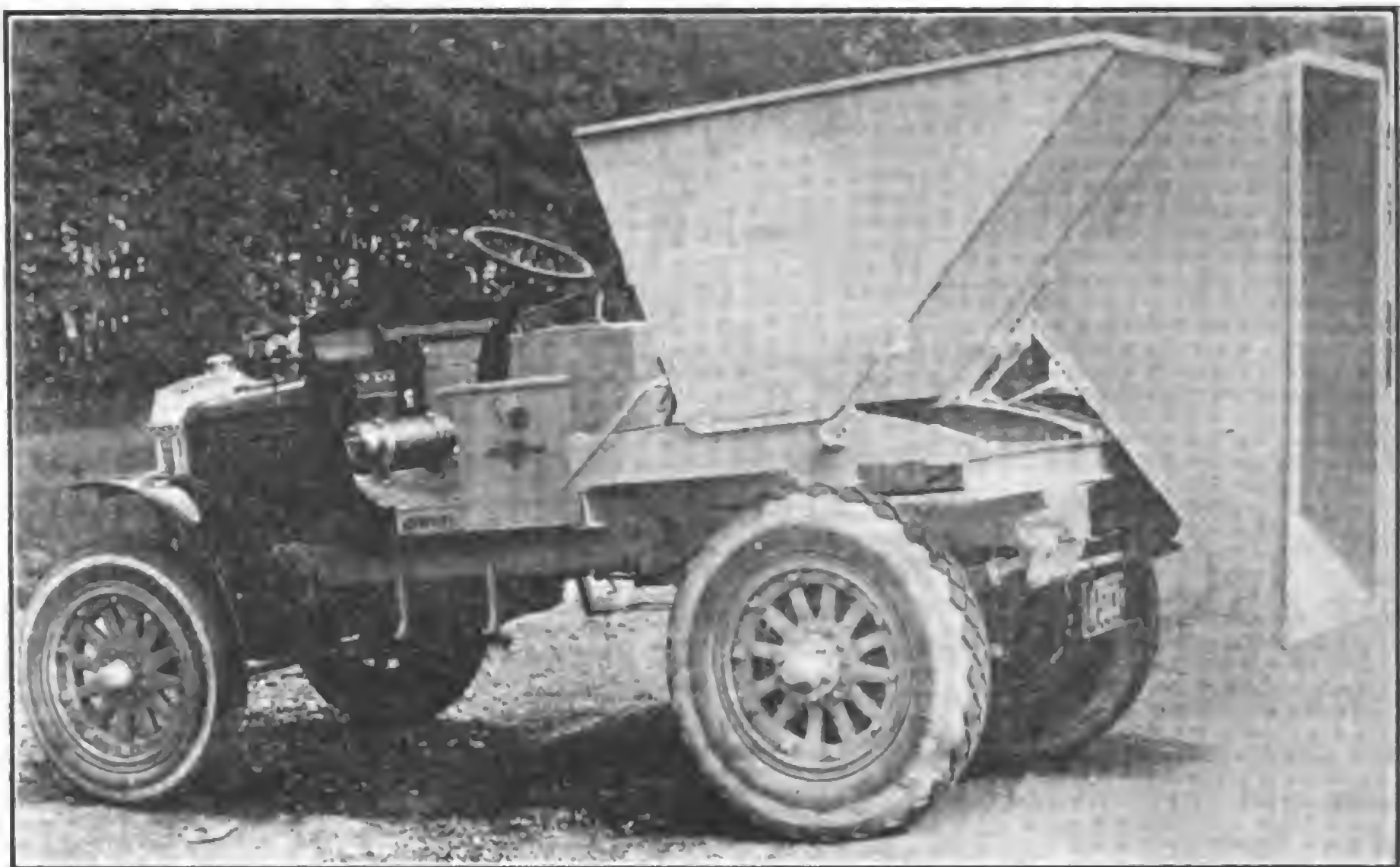
Since placing this model on the market, however, there has been a pronounced demand from other lines of business, the coal business in particular.

Some of the advantages of these trucks are as follows: Their exceptionally short turning radius of 20 feet due to their short wheelbase of 105½ inches on the 20R and 110 inches on the 7CX makes it possible for them to turn around in limited quarters or narrow streets with the shortest possible loss of time.

They will not sink into fresh sub-grades because of their big pneumatic tires. With the dual hopper body it is possible to carry a measured charge of sand and gravel to the concrete mixer. They are fast, thus enabling the contractor to get his wet concrete batch from a central mixing plant to the laying point without danger of setting. These trucks make a speed of 17 miles an hour and will negotiate rough roads at their maximum speed.

The bodies will dump wet concrete clean without the necessity of shovelling or scraping because of their unusually steep dumping angle. The cost of these units is lower than the cost of dump trucks operated by hydraulic or mechanical hoists.

The prices are as follows: Model 20R, wheelbase 105½ inches, with one-yard single hopper, \$3500; model 20R, wheelbase 105½ inches, with dual hoppers of ½-yard capacity each, total capacity one cubic yard, \$3650; model 7CX, wheelbase 110 inches, with two-yard single hopper, \$4150; model 7CX, wheelbase 110 inches, with dual hoppers of one-yard capacity each, total capacity two cubic yards, \$4250. All prices f. o. b. Buffalo, N. Y.



Special Short Wheelbase Atterbury Truck Chassis Equipped with Double Dumping Bodies, Designed for Road Contractors' Use.

The standard 7CX and 20R specifications apply in every respect except in the case of wheelbase, tires and cab. The tires are pneumatics of the usual sizes supplied on these models and each chassis is equipped with a power-driven tire pump and two spare rims. In place of the customary cab, a plain seat is used just large enough for the driver, the balance of the space being occupied by a heavy tool box equipped with a pad lock.

Actual results in the hands of owners have proven these contractors' specials to be time savers and money makers for the contractor.

New Heavy Duty Semi-Trailer

A NEW type of heavy-duty, semi-trailer, designed by J. B. Mansfield, president of the Detroit Trailer Co., 954 East Milwaukee avenue, Detroit, Mich., was recently tested at the factory and found fully practical for the

work. Several orders were placed for first production following the trial.

The semi-trailer departs from the conventional in that it has four wheels in line instead of two. Thus giving a total tire surface of 48 inches and permitting a load disposition of about 800 pounds a square inch. Each of the four wheels are mounted on special Mansfield axles with radius rods on ball joints. Double spring action is also provided by Detroit semi-elliptic springs, each spring having a rated capacity of 12 tons with the spring shackles of steel.

The job is equipped with four Dayton steel wheels, 40 by 12 inches, fitted with Timken roller bearings and 12-inch solid rubber tires.

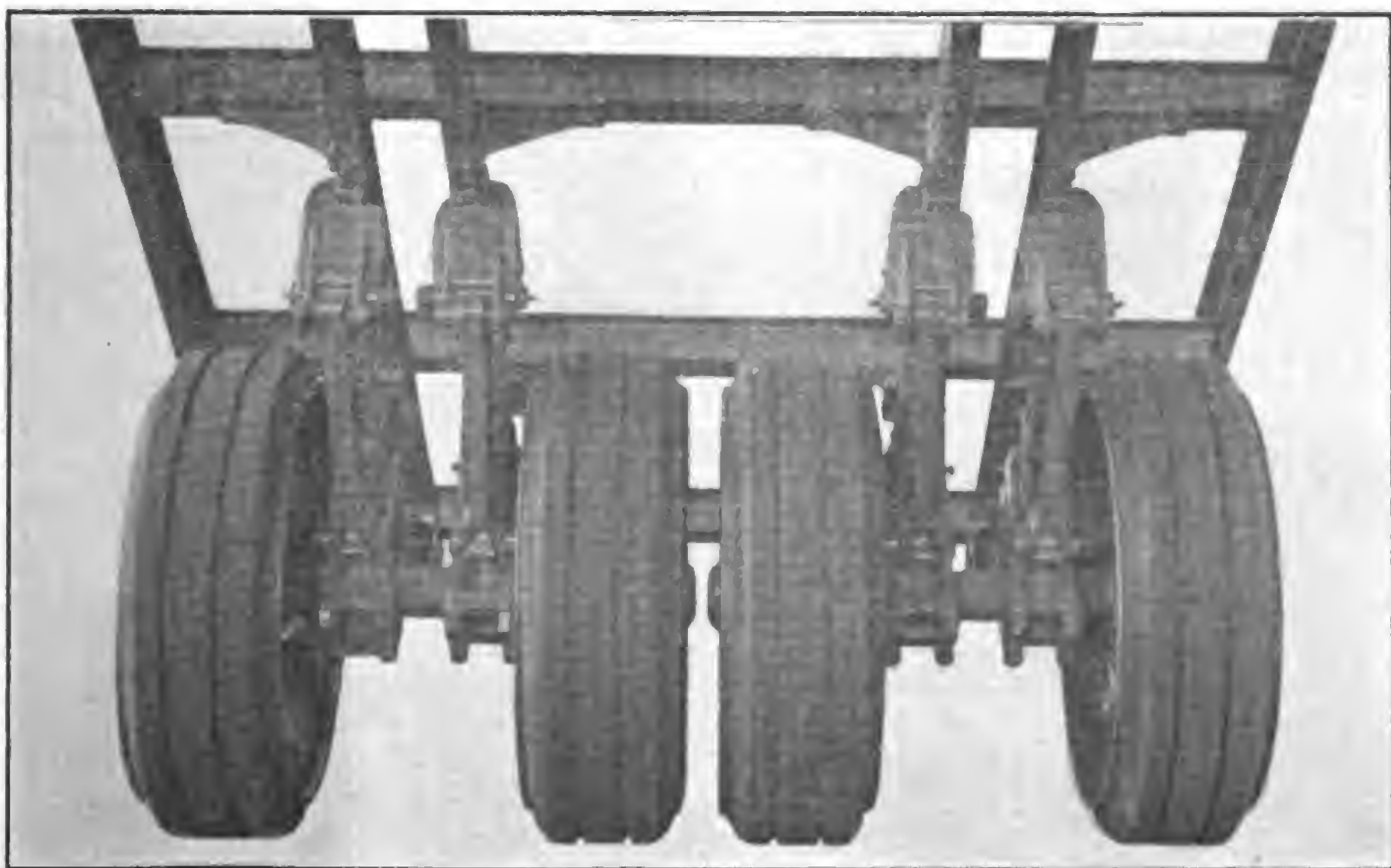
The semi-trailer is equipped with a frame seven feet wide and 22 feet long and is made of extra heavy channel steel for the very hardest kind of service. Through the use of eight wheels to carry the load the trailer overcomes over-loading legislation.

The company reports that one of these semi-trailers is now being used for the hauling of some 8000 or 10,000 tons of steel for one of the big New York hotels and its ease of operation and ready adjustment to uneven roads make it, the company believes, an ideal job. In running over concrete roads where the road bed is full of small holes, instead of the wheel dropping into the hole, it rides free and throws the load on the other three wheels; a feature which is very desirable, as it gives practically no shock.

On gravel roads the trailer, after passing over it several times, improves the condition of the gravel surface as the four large tires act as a roller, smoothing the surface.

The capacity of the heavy-duty, semi-trailer is given as 50 tons and the price as \$2750 f. o. b.

George N. Duffy has been made chief inspector of the Wahl Co., 1800 Roscoe street, Chicago, Ill. He was formerly production engineer for Willys-Overland, Ltd., West Toronto, Ontario, Canada.



Semi-Trailer Built for Heavy Hauling Service—Special Spring Suspension Distributes Load Equally When Passing Over Uneven Surfaces.

Combined Truck and Tractor

**New Machine, Designed for General Purpose Service,
Negotiates Muddy Roads with Ease—Has Power Take-
Off at Rear for Driving Stationary Machinery.**

AS AN example of a truck designed to combine road speed with extreme slow speed pulling ability and also that could operate under practically all conditions of travel, enabling quick handling of loads over hard-surfaced roads, at the same time being able to travel with safety over soft spring roads with an assurance of not becoming mired, may be cited a new product of the Buffalo Truck & Tractor Corporation, Clarence, N. Y., called the Buffalo Truck Tractor. The first truck built by this company, over a year ago, was a 1½-ton job, equipped with a Lycoming engine of 19.1 horsepower. The remarkable results achieved with this job showed the company the possibilities of this type of construction and it is now placing in production a 2½-ton model built along the same lines as the former Truck Tractor, but embodying several improvements and features not found in the former.

THE new Buffalo Truck Tractor is equipped with a Hercules four-cylinder engine having a bore of four inches and stroke of 5½ inches, with horsepower, under the S. A. E. rating of 25.6, or with a normal rating of 36.5 horsepower. The engine is equipped with five main journals, which prevents whipping of the crankshaft and provides unusual strength. The engine reciprocating units are made of the highest grade of steel designed especially for use in this make of engine, enabling it to deliver its full rated power under the most trying conditions.

Cooling is accomplished by means of a pump circulating system, a large capacity radiator mounted in the conventional position and a large four-bladed fan, while additional cooling is supplied by a combination of three hollow balls in front of the radiator connected top and bottom with the radiator tanks, used primarily for power purposes or long continued operating on low speeds. The engine is governed by a Simplex type governor. Carburetion is furnished by a Zenith Model L, non-adjustable carburetor and ignition by a Bosch D-U-4 high-tension magneto.

The starting and lighting system is Bosch in connection with a Willard storage battery.

The clutch is of the multiple-disc type, enclosed in the fly wheel housing, and adjoins the forward transmission unit, which is in unit with the power plant. The transmissions are both of the selective sliding gear type, consisting of three forward speeds and one reverse each. The second transmission is placed amidship, operating in connection with the first through a separate gear shift lever. The combined speeds of the two transmissions gives the driver 10 forward speeds, four reverse speeds and enables him to negotiate ground that it is claimed would be next to impossible for the ordinary truck equipped with four forward speeds and one reverse speed to travel.

The lowest gear ratio gives a speed reduction of approximately 150 to one, allowing the driver speeds ranging from one mile in seven hours to 25 miles an hour. This arrangement gives any speed

or power required and keeps the engine operating at normal speed.

Through a unique arrangement the truck tractor may be used for supplying power to farm implements or stationary machinery within the range of the power of the engine. Between the front and rear transmission is located a simple power transmission consisting of a counter line shaft running to the rear and extending beyond the rear frame to allow a split pulley to be mounted. This shaft is geared down 2½ to one of the engine speed and is fitted with two Hyatt roller bearings, mounted at the rear and center of the shaft. This shaft is equipped with three forward speeds and one reverse. The gear case is supplied with four Timken bearings at each end of the short gear shafts.

Specially designed flexible universal joints transmit the engine power through the propeller shaft to the worm and worm gear of the rear axle. The rear axle is a Sheldon worm and worm gear type noted for its rugged construction and wear-resisting qualities and is unusually large for this size of truck.

Both brakes are of ample size, of the internal expanding type, enclosed in the brake drums and are oil and dust-proof. Final drive is by means of the well-

known Hotchkiss drive, which is considered the simplest method for this type of truck. The front axle is a Sheldon I-beam drop forging; the springs are semi-elliptic, front and rear, made of high-carbon steel having an elastic limit after heat treatment of 130,000 pounds a square inch. The rear springs are three inches wide and 54 inches long, while the front members are 2½ inches wide and 42 inches long.

The steering gear is a Ross fore and aft type fitted with a 20-inch wheel, at the left side of driver's seat with gear shift and emergency brake levers in the center at the driver's right.

The wheels are of wood, heavy artillery type, fitted with pneumatic tires, front 36 by six inches and rear 40 by eight inches, or solids, front 36 by five inches and rear 40 by five inches duals. The pneumatic tires are mounted on demountable rims and are guaranteed for 10,000 miles' service.

The wheelbase is 155 inches, an increase of five inches over the previous model, while the tread has been increased from 56 to 58 inches front and to 62 inches rear. Full equipment is included with each truck, including whistle, heavy jack, complete set of tools and driver's seat and the usual accessories.



Additional Water Capacity for Heavy Work Is Provided by Three Extra Tanks Placed in Front of Radiator Protected by Steel Guards—Caterpillar Tires Standard.

(Continued from Page 564.)

much smaller in size for given distance than any machine wound coil on the market.

These inductances can be wound to any size and shaped to any desired inductance. This is on account of its mechanical construction, whereby greater inductance can be secured and, owing to its regulated construction, it is a very strong, compact unit.

The Duo-Lateral coil differs from the honeycomb coil winding in that the alternate layers of wires are positioned above and between the wires of the lower layer in the former and parallel with the wires of the lower layer of wires in the latter.

In recent tests with a Mexico City radio station, it was found that on a wave length of 4500 meters the signals were 100 per cent. louder than given by other existing types of inductance coils.

The Duo-Lateral inductance coil has attracted the attention of the "Big Three" (the three largest radio manufacturing companies). Dr. J. H. Rogers is at present using them in connection with his underground circuit, and is also employing them in his experiments to determine whether or not Mars is signalling the earth.

Signals, barely audible, and in some cases inaudible, are easily readable with the Duo-Lateral coil, which marks this as undoubtedly the greatest step forward in the radio art since the introduction of the vacuum tube.

By means of several of these Duo-Lateral coils, together with one or two variable condensers and a vacuum tube unit, it becomes possible to receive a high range of signals, it is stated, and to cover exceptional distances. In brief, such a combination represents the ultra-efficient in radio receiving with or without amplification.

Tests Radiophone with Coupe.

Mr. Giblin recently equipped his Ford coupe with a radiophone outfit and demonstrated to his friends the possibilities of this form of telephoning.

Tests took place recently at a local battery station owned by Harry Hanlon, a man well versed in electrical work through long years of practical experience on storage batteries and steam engine practise for the local trolley company. The Ford coupe was driven into the basement of the station and conversation carried on between Mr. Giblin's home and the receiving set in the Ford coupe. An ordinary house radio receiving set was used, and the conversation was unusually clear for the short distance transmitted, about a mile, and the fact that more or less noise from the street interfered. The sound of the voice was distinct and so intense that it was necessary for Mr. Giblin to hold the receivers away from his ears to hear with comfort.

The car was next driven out of the city for several miles and communication again established with Mr. Giblin's home. The voice at the receiving set in the Ford coupe was heard clearly and without the sharp tones experienced in the battery station. To still further test the abilities of the phone the car was driven due east

to Middleboro, Mass., a distance of about 30 miles, and the resulting conversation between the two points was transmitted more successfully than at the shorter distance. The following day the car was driven to Plainville, Mass., a distance of about 20 miles, and the experiment was repeated. Connections were easily established and the conversation heard as clearly as at the 30-mile distance of the day before, proving that the radiophone worked better at longer distances than it did near by. Although tests were not given at this time to demonstrate the full limit of the 'phones, confidence is expressed by Mr. Giblin that it would easily answer for establishing communication between points 150 miles apart, as for instance, between truck drivers away from their home office on trips.

The receiving set used in the Ford coupe was a house set somewhat larger

ALREADY IN USE.

The Radiophone is being used by several heads of fire and police departments with marked success. In at least two recent instances the use of this device has resulted in the capture of criminals. A story is told of a fire department chief who used his Radiophone to summon additional apparatus when the local telephone service was interrupted, the fire being in the outskirts of the city and too far away from the call box to admit using that system.

than required for radiophone work in a car or truck, and is capable of being reduced in size and still retain its ability to receive over the distances specified. To install a transmitting set to be used in conjunction with the receiving set would probably cost in the neighborhood of \$150 for a direct current generator of sufficient size to generate current of sufficient voltage for transmitting.

As stated above two factors enter into the successful operation of the radiophone, one being the voltage of the generator, which must be a direct-current machine of about 350 to 500 volts capacity and the other the amperage which, in the case mentioned, is about .5 of an ampere.

The current necessary to operate the receiving set in the Ford coupe was taken from the storage battery of the car and for the short time that the conversation was carried on caused very little drain on the battery; so small in fact that it was unnoticeable.

The antennae were conveniently located on the top of the car, but seven feet from the ground, and the car was necessarily insulated from the ground by the four rubber tires. No ground connection

was used in any of the tests and it was found that conversation was carried on successfully without it.

Mr. Giblin feels that he has added something to the benefits of mankind by the results thus far obtained. He has been an enthusiast in this subject for a number of years and although still in his thirties, he has wide experience in government wireless service and has been a deep student of all that is going on in the wireless world. Mr. Giblin is at present superintendent of the Standard Radio & Electric Co., Pawtucket, R. I., manufacturer of small electrical units, including cut-outs for automobile wiring systems, storage batteries, radio coils and units of various descriptions. His prediction that great strides will be made during the next five years in radio work compels more than passing thought of this, the latest and newest science which is interesting mankind both old and young. He states that he feels very sure that the radiophone will be very generally adopted and widely used by motor vehicles because it reveals opportunities heretofore considered impossible and opens a wide field of usefulness for radio apparatus of the telephone type.

The Ford Motor Co., through its local state agent, Dutee Wilcox Flint, has become very much interested in this project, as a Ford coupe was used for the experimental work. What this will eventually lead to cannot be predicted, but one can conjecture that it will be their endeavor to interest commercial houses in the possibilities to be gained by equipping Ford salesman's cars with radiophones so that the house sales manager may be in constant touch with his salesmen while on the road. The benefits of this feature are readily understood when one realizes that salesmen for commercial houses are often on the road for weeks at a time and often far from points of communication with the home office.

Doctors are often wanted out of office hours when they are making their calls. With a radiophone installed in the office and a similar set in the doctor's car it would be a simple matter to summon him in emergency cases. Fleet owners often wish to re-route their trucks from some distant point; this is now often impossible, but the radiophone with its wide range could quickly locate the missing truck, deliver its message and send the truck and its driver to a point designated where additional work is available.

Other Uses for Radiophone.

The Westinghouse Electric Co. quite recently mounted a sensitive wireless receiving outfit on a motor truck using a loop aerial as antenna. The truck is driven parallel to a high-tension power line to discover the leakage of the insulators. Wherever there is a bad leakage the crackling sound in the receivers of the radio outfit will quickly reveal the energy going to waste. An insulator may look all right from the outside, but it might be porous and thus waste a lot of the company's power. The radio receiver will instantly detect the bad insulator. Power companies in the West are now opening and closing switches in distant sub-power plants by radio. Instead of keeping an operator at each sub-station

to throw the switches in and out, this is now accomplished without the touch of human hands.

Other possible uses will suggest themselves such as trailing stolen automobiles by sound, pursuing automobile thieves, detecting bodies of mineral ore, hidden treasure and large bodies of oil. These are just a few ideas and methods of working them out will no doubt occur to radio operators of experience.

The government also plans to send certain information to farmers at a certain hour in order those wishing it may be advised of the hour to expect it.

The British government is already considering the appointing of a commission composed of representatives of all of her colonies to consider the practical means available for the development of imperial communication by land, sea, air, radio telegraphy and radio telephony.

Some experiments with wireless telephone apparatus have recently been made between Sainte Assise (near Melu) and Beauvais, France. Transmission and receiving were effected by means of valve sets manufactured by the Societe Francaise Radio-electrique using a transmitting energy of not more than five watts. The distance between the two stations is 74 miles, but no difficulty was experienced throughout the entire test.

USE OF MOTOR TRUCKS ON FARMS.

(Continued from Page 561.)

Custom Work.

A considerable number of farmers have purchased trucks primarily for doing custom hauling and only incidentally for work on their own farms, but such use of a truck is really an enterprise separate from the operation of the farm. However, the man who purchases a truck simply as an addition to his farm equipment may find it possible and profitable to do some custom hauling for his neighbors. About 28 per cent. of the men who report on this item state that they did some custom work during the year covered by their reports. The average amount received by the men who did such work was \$174. About 30 per cent. of these men who had done custom work state that it had not been profitable.

The distances travelled by the trucks, on which reports are available, averaged 3820 miles a year. About 42 per cent. report the annual mileage as from 1250 to 3250, 29 per cent. from 3250 to 5230, 10 per cent. 1250 or less and about eight per cent. 5250 to 7250 and over 7250 respectively.

These men also estimate the number of days a year on which they use their trucks—not the number of full day's work—but simply those on which some use was made of it. On the average, truck

farmers use their machines on 160 days during the year, dairy farmers on 244 days, fruit farmers 159, crop farmers 127, and general farmers on 162.

Cost of Operation.

The average first cost of the trucks of different sizes, including extra equipment, was \$600 for the half-ton, \$1306 for the $\frac{3}{4}$ -ton, \$959 for the one-ton, \$1842 for the $1\frac{1}{4}$ -ton and $1\frac{1}{2}$ -ton, and \$2465 for the two-ton.

The average life of all these trucks, as estimated by the owner, is 6.7 years. The estimated life of the $\frac{1}{2}$ -ton trucks is 6.6 years, $\frac{3}{4}$ -ton 7.1, one ton 6.3, $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton 7.2 years and two-ton trucks 7.9 years.

The average first costs of the trucks of different sizes divided by the average life gives an annual depreciation of \$91 for the $\frac{1}{2}$ -ton trucks, \$184 for the $\frac{3}{4}$ -ton, \$152 for the one-ton, \$256 for the $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton, and \$312 for the two-ton trucks. The annual depreciation divided by the average number of miles travelled per year gives a depreciation charge per mile of travel of 2.4 cents for the $\frac{1}{2}$ -ton trucks, 4.2 cents for the $\frac{3}{4}$ -ton, 4.1 cents for the one-ton, 8.3 cents for the $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton, and 7.7 cents for the two-ton trucks.

Forty per cent. of the men who had owned their trucks 12 months or less had spent nothing for repairs, and for no size had the repairs for machines which had been in use less than a year cost more than \$20 on the average. About 100 men who had owned their trucks more than

three years report the cost of repairs. The average age of these older trucks is not far from four years, and the average annual repair costs to date for the $\frac{1}{2}$ -ton trucks had been about \$35; for the $\frac{3}{4}$ -ton, about \$50; for the one-ton, about \$40; for the $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton, about \$35, for the two-ton trucks, over \$100.

It is apparent, however, that these figures are too low for the average annual repair cost for the entire life of the machine. Based on present prices, a fair average for the repair costs covering the entire life of the machines would probably be something like \$50 a year for the $\frac{1}{2}$ -ton trucks, \$75 for the $\frac{3}{4}$ -ton, \$75 for the one-ton, \$100 for the $1\frac{1}{4}$ and $1\frac{1}{2}$ -ton, and \$150 for the two-ton trucks.

Last, but not by any means the least important, are the data on the reliability of the truck. The returns show that 71 per cent. of the trucks had not been out of order at all when needed, 20 per cent. had been out of order five days or less, six per cent. from six to 10 days and three per cent. had been out of order over 10 days. Eighty per cent. of the men whose trucks have been in use 12 months or less state that they have lost no appreciable time, but only one-half of those whose trucks have been in use more than three years state they have lost no time. In all, 67 per cent. of the total state that they have lost no time, and only one man in 26 states that more than five per cent. of the time is lost on this account.

(Continued from Page 603.)

work formerly done by steam in a highly satisfactory manner and as the expense of operation is much less the cost of doing work is materially lessened. This opens up a new field of usefulness for cranes as it puts within reach of many concerns who would like to use cranes an outfit which is capable of doing much of the heavy work formerly done by hand and at the same time at a great saving.

The cranes manufactured by the Pawling & Harnischfeger Co. have been designed to meet the popular demand for equipment of light portability, yet sufficiently strong to withstand the strains of such hard work as excavating, unloading coal, iron and crushed stone and the kindred lines for which this type of outfit is peculiarly fitted. The front wheels equipped with wide rims and long axles assist in keeping the crane steady when at work, while the rear is supported by a caterpillar track-laying type of drive instead of wheels, by which the machine is driven over the road and which also assists in moving the crane forward into the work. These provide a firm base for

the crane's operations and enable it to travel over soft ground in case of emergencies.

Powered by Tractor Type Engine.

The crane is powered by a heavy-duty, four-cylinder, four-cycle, vertical tractor type engine equipped with the necessary fuel tanks, cooling system, etc., similar to those found in high-grade tractors. The radiator is mounted in front of the engine, at the side of the crane platform, amply cooling the engine under all conditions of work.

Suitable spur gears connect the revolving platform with a large spur gear fastened to the special mounting which allows the platform supporting the crane and engine to turn and work in any direction at the will of the operator.

When unloading metal, such as pig iron from cars, a powerful magnet is used to lift the pig iron, current being supplied from city power lines. But for ordinary excavating, drag line and road work, an ordinary clam shell or excavating bucket is used.

In connection with motor trucks, a crane of this type forms a unit which may have many uses in and about in-

dustrial plants, for road construction and in general contracting work.

(Continued from Page 602.)

at the top. The flare sides are of $\frac{3}{8}$ -inch oak, six inches wide and are inclined at a 45-degree angle. The tail gate is $15\frac{1}{2}$ inches high and is held dropped in position with a tail chain. The top is supported by four wooden posts and extends the full length of the body overhanging the seat and windshield. Roll-up curtains of black oiled duck enclose the sides and rear, while the roof is covered with No. 10 painted sail duck. The height of the top from the floor to the under side of the top is five feet. The seat cushion is covered with imitation leather over deep cushion springs, while a lazy back is provided, the full length of the seat, fully upholstered over coiled springs.

The price of the Traffic "Speedboy" truck, complete with body and top, is given as \$1695, f. o. b. St. Louis, equipped with heavy disc air plane type wheels with demountable rims, made from selected grade of thin wood laminations, having the grain placed diagonally.

Meets Special Need

A NEW tractor developed by the Racine Engineering Co., Racine, Wis., of which A. Y. Dodge is the head, is stated to go a long way toward replacing horses on the farm. It is fundamentally a farm tractor. By removing the tractor wheels and fitting rubber-tired truck wheels and mounting a trailer behind, it forms an excellent $2\frac{1}{2}$ -ton motor truck which is capable of performing road hauling at the rate of 18 miles an hour. The change of wheels, it is stated, can easily be made in less than one-half hour by one man.

Mounting the trailer to the tractor when equipped with tractor wheels it will do field hauling even under the most difficult conditions.

By means of a clever wheel design the tread is increased 16 inches by merely inverting the wheels, enabling them to straddle two rows of corn in cultivating operations. The above features, with other details, it is said, have been and are being covered by many patents. It is also rumored that three or four companies will be licensed to manufacture this machine, the Racine Engineering Co. to furnish the engineering service.

When plowing two wheels of the tractor run in the furrow. Special wheel lugs, a product of the Racine Engineering Co., are used for traction. These wheel lugs can be attached or detached in five minutes' time, it is stated. A series of 13 lugs, 12 of which are held together by linking pins much resembling a dumb-bell, extend around the wheel linked together in the form of a chain. The last coupling consists of a bolt and nut which draws the set of lugs tight, and tightening all of the linking pins. The entire set of lugs are free to creep slightly when in use, making the wheel self-cleaning.

A quadrant is located at the left side of the fan shroud, which regulates a damper in front of the cooling fan. By means of this damper the amount of draft passing through the radiator can be regulated.

Two Sets of Controls Available.

Two sets of controls are provided, a lever control operated from the rear platform and a pedal from the toe board for hauling work. The steering column is adjustable and the driver's seat is quickly removed as it is positioned by dowels fastened to the floor boards.

A rear view of the tractor clearly shows the controls and leads one to believe that this is a worm-driven tractor. A worm is used as far as the final drive which consists of multi-pinions located near each rear wheel inside the enlarged portion of the axle housing. The worm is a $6\frac{3}{4}$ to one reduction and is the first reduction, the final reduction taking the heavy load. A reduction of 40 to one is secured in this type of axle in two steps; first, the worm, and second the final drive, which is of the multi-pinion type. Both the worm and the final drive operate in a bath of oil. With this drive the tooth pressure, it is stated, is reduced to less than half of that found in conventional practice. Each rear wheel is driven by at least six gear teeth at all times by this method of final drive.

By means of this final drive a very simple two-speed axle has been worked out which enables the manufacturer to equip this machine with two sets of wheels. When fitted with rubber tires and truck wheels this tractor will travel as high as 18 miles an hour and handle a $2\frac{1}{2}$ -ton trailer with ease. When so equipped the final multi-pinion drive is not engaged. The wheels are driven direct from the differential located in the center of the axle housing, the worm and worm wheels.

Special Jack Supports Trailer.

Special attention is called to a jack which is carried folded under the trailer. Being released by means of a catch the jack drops and locks in a vertical position. A hand crank is used to raise and lower the jack, which moves the front end of trailer up or down so that it may be coupled to or uncoupled from the tractor. Springs are provided on the trailer between the axle and body which carry the load front and rear.

Provision is made for inverting the wheels in order to increase the tread sufficiently so that two rows of corn may be straddled in cultivating. In this manner the tractor may be used for either cultivating or back listing corn with equally

and One Reverse; Separate Speed for Belt Work.

Clutch—Twin-Disc Type, Operating Belt Pulley and Driving Tractor.

Road Speed—18 Miles an Hour at 1000 R. P. M.

Plowing Speed— $3\frac{3}{4}$ Miles an Hour at 1000 R. P. M.

Governor—Pierce.

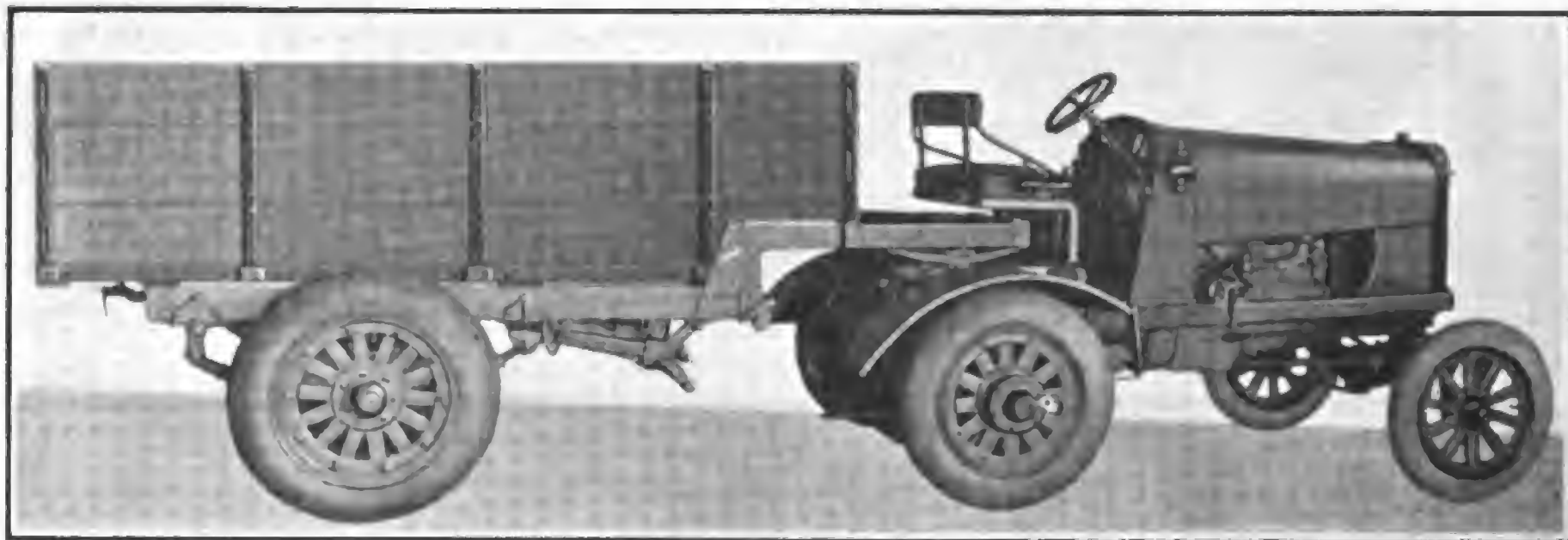
Belt Pulley—15-Inch Diameter, $8\frac{1}{2}$ -Inch Face.

Front Axle—Pivoted, Allowing Three-Point Suspension; Tractor Mounted on Leaf Spring.

Rear Axle—Mounted Rigid.

GETTING THE MOST OUT OF THE MOTOR TRUCK.

The transmission, similar to other units of the motor truck, requires lubrication at intervals to obtain the best results. Too much lubricant should not be used as the result will be nearly as bad as if too little were supplied. If the countershaft is just covered with grease, the entire transmission will be thoroughly lubricated, while if too much grease is supplied at one time there is grave danger of its working through the bearing caps past the felt washers. A good grade of lubricant which has the proper consistency is 600 W or a grease of an equal body.



This Tractor and Trailer Fitted with Pneumatic Tires Forms Practical Farm Truck Equipment Which Has Many Uses.

good results. In addition to inverting the wheels the rear platform is removed in order to give clearance in the rear. In taking off the platform it is only necessary to remove six bolts.

In cultivating the Dodge tractor may be used as a one-man machine in connection with the cultivating attachments provided by the manufacturer. The cultivator attachments are fitted underneath the tractor and controlled from the driver's seat.

Or, if one prefers, the tractor may be used in connection with a two-row, pivot-axle cultivator, which may be drawn in the regular manner, requiring two men to operate.

A special frame mounting is provided for the power units. A unique spring mounting is provided for the front axle, which allows the frame and power units to pivot when passing over uneven ground, and a transmission which enables the farmer to shift from one speed to another while the tractor is in motion, are features which distinguish this tractor.

SPECIFICATIONS.

Engine—Midwest, Three-Point Suspension.

Bore and Stroke— $4\frac{1}{2}$ by Six Inches.

Horsepower—32.4, S. A. E. Rating.

Transmission—Three Speeds Forward

Adjustments to the transmission, after it is placed in the truck, are not necessary and should not be attempted unless some accident has happened.

Whenever the inspection plates or covers are removed from the transmission great care should be taken to see that grit or foreign matter does not enter, as it is such material that cuts the bearings and makes rough working surfaces, which produce undue wear and quickly tend to ruin the mechanism through no fault of the transmission.

If the truck driver will note that the transmission at all times is held firmly in place in the truck frame, that all supporting bolts and brackets are tight and that good, clean oil is used in the transmission, it may be entirely forgotten and still perform its duty in an unfailing manner.

The transmission grease should be cleaned out at least twice a year, and the gear box washed inside by running benzine or gasoline through it, after which it should be again filled with clean oil.

If these few, simple instructions are followed the transmission will perform its gruelling service for years without attention of any other kind.

The motor truck is a sensitive machine and requires attention just as does any other highly-organized mechanism.

TRUCK MANUFACTURERS ENDORSE WOOD-DETROIT HYDRAULIC HOISTS AND STEEL DUMP BODIES

WOOD Hydraulic Hoists

Truck manufacturers realize that every part of the equipment either standard or special must stand up under most rigid conditions, severe tests and usage, hence the adoption as standard the Wood-Detroit Hydraulic Hoists and Steel Dump Bodies by most of the truck manufacturers of the country.

The Wood-Detroit Hydraulic Hoist is so widely used that it has been called the "universal hoist" and is noted for its rugged, sturdy construction, dependability and simplicity of installation and operation.

The following partial list of manufacturers that standardize on Wood-Detroit Hydraulic Hoists:

Acason	Garford	Lewis-Hall	Republic	Swedish-Crucible
American	GMC	Locomobile	Reynolds	Tiffin
Armleder	Gramm-Bernstein	Maccar	Rowe Motor	Triangle
Atterbury	Hamilton	Mapleleaf	Sanford	Traylor
Bessemer	Independent	Moreland	Schwartz	Truck Engineering
Brockway	International (Mack)	National	Selden	Union Motor
Corbitt	International Harvester	Noble	Service	Velie
Clydesdale	Jackson Motor	Nelson	Signal	Ward-LaFrance
Day-Elder	Kelly-Springfield	Packard	Standard	Watson
Defiance	Lange	Paige-Detroit	Sullivan	J. C. Wilson
Denby	LarrabeeDeyo	Pittsburgh Motor		

Branches, Sales and Service:

Detroit	Milwaukee	Cleveland	Boston	New York
Chicago	St. Louis	Pittsburgh	San Francisco	Portland
Los Angeles	Denver	Seattle	Philadelphia	

WOOD DETROIT HYDRAULIC HOIST & BODY CO., DETROIT, MICHIGAN.



You can sell trucks
now to a receptive
market if you can
qualify with our re-
quirements.

No obligation and
a sensible reply if
you address

Box No. 25
MOTOR TRUCK

New Bessemer Prices

We Have Made Drastic Price Reductions

1 Ton was
\$1,700.00 Now **\$1,395.00**

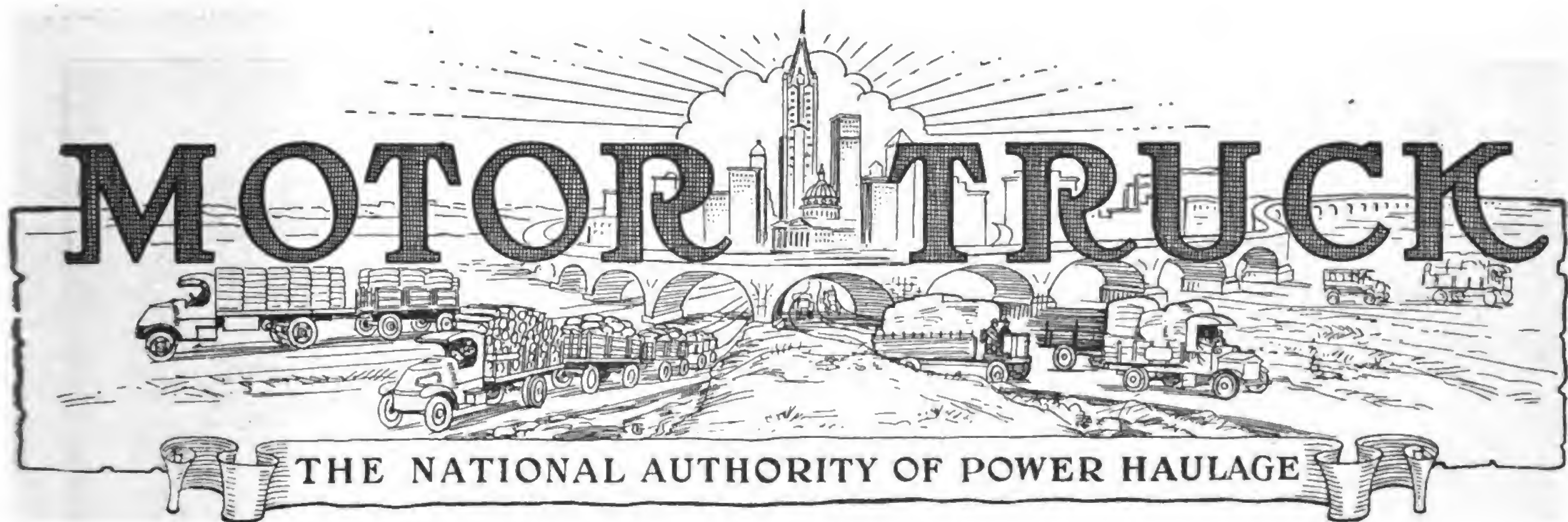
1½ Ton was
\$2,445.00 Now **1,995.00**

2½ Ton was
\$3,285.00 Now **2,595.00**

4 Ton was
\$4,485.00 Now **3,495.00**

Electric Starter and Lights Extra

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)



THE NATIONAL AUTHORITY OF POWER HAULAGE

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PAWTUCKET, R. I.

DECEMBER, 1921.

What Do You Know About Gasoline?

This Article Tells How It Is Made, Detailing in a Direct, Simple Manner Each Step in the Manufacture of a Very Necessary Commodity.

THE quality of gasoline, a subject of interest to every motorist, truck driver and tractor operator, varies as is well known. But the reason for this fluctuation is little known and not often made a matter of serious thought by the average layman, and the object of the present article is to give an idea of how this ubiquitous liquid, upon which the very existence of the automotive industry today depends, is derived from

crude oils, gases and shales, the process of refining and a few of the tests given by the various oil companies to meet the quality standards set by the United States government for the protection of the ultimate consumer. It is common to hear motor vehicle operators remark that such and such a brand of gasoline is better or poorer than another and it may be wondered on what they base their opinions and the cause for the difference if it exists.

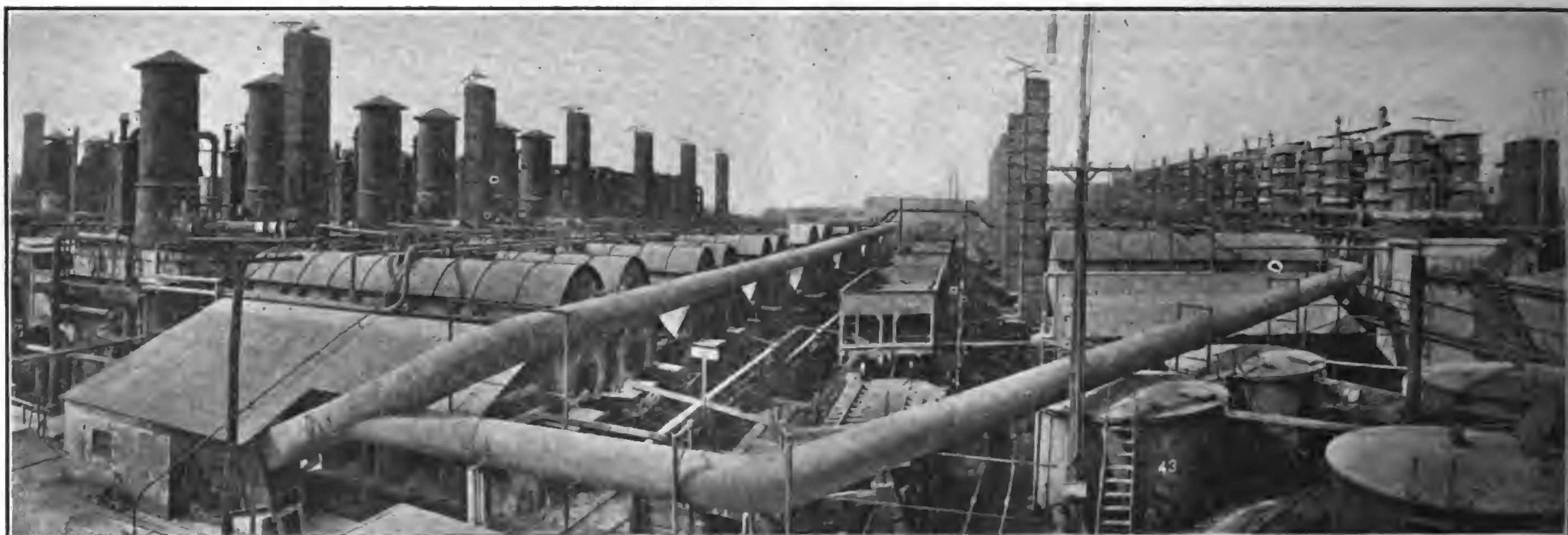
GASOLINE is a product of distillation which takes place when the crude oil, as it is obtained from the oil field, is placed in a retort either large or small and heated by outside means till the lighter parts, consisting of gasoline, naphtha, benzine and kerosene, are forced as steam to rise from the retort and to pass over through a connecting tube, immersed in water, the function of which is to condense the vapor, and it is finally received in a vacuum tube in the form of a liquid. The lightest vapor which comes off first is gasoline and this is treated



Developments, Such as Are Illustrated by This Vast Field of Refinery Storage Tanks, Have Been Made Possible by the Internal Combustion Engine.

and retreated until all impurities have been removed, after which it is stored in containers for use in driving automotive engines, cleaning and other purposes.

The chief reason for its variation in quality is that the great demand created for this fuel has led the companies manufacturing it to allow heavier products, such as kerosene, which increase the specific gravity, but lower the fire and flash test, to be run in. The different vapors arising from crude oil in distillation are so closely related that it is a very easy matter to allow them to come together in the va-



Panorama of Batteries Showing Crude Oil Stills Equipped with Van Dyke and Gray Aerial Condensers—To Eye of Uninitiated This Scene Gives an Impression of Complexity Which Is Heightened as One Views the Many Other Operations.

cuum chamber and mix as one.

Gasoline was tested in the good old days, when it was comparatively plentiful and low in price, merely by its specific gravity as compared with that of water, which is arbitrarily set by scientists for convenience in experimentation and to effect a standard of comparisons, at 100. Gasoline, being a much lighter liquid, was formerly required to test around 65 to 70. Today this gravity test is considered unreliable because kerosene can be mixed with gasoline in such proportions that the resulting test will show high, but the elements which make for rapid and complete vaporization will not be present, and the result will be a slow-burning mixture that requires a large amount of heat to vaporize it thoroughly. So much of this low-grade gasoline is now being marketed that engine designers have been forced to redesign their engine manifolds to take advantage of the heat from the engine exhaust to vaporize the fuel thoroughly. This has led to the general adoption of the "hot spot," so-called, by which the intake exhaust manifolds are a unit at the side of the engine. This solves the problem of poor fuel in a measure, but does not overcome the trouble of starting the engine freely when cold. Various devices of an electrical nature are now available which can be attached to the carburetor, the small heating unit being operated from the storage battery of the car or truck. Quicker starting is assured with a slight drain on the battery only at the start.

The statement is often heard to be made by the motorist after using the ordinary commercial gasoline for a period, that if he could only obtain special highest gasoline, such as is used in aviation work, his troubles would be over and the additional cost of a few cents a gallon would be money well spent. This highest gasoline is nothing more than "casing head" gasoline, obtained from the well gases as they arise from the well opening, and are reclaimed by a special process which allows the gasoline to be refined. This gasoline is practically pure and is mixed with commercial gasoline to increase the fire and flash tests. Large quantities of it are not used, however, because its cost would be prohibitive, but

by mixing it with lower grades the quality is maintained and the price is kept within the reach of the vast majority of users.

History of Crude Oil.

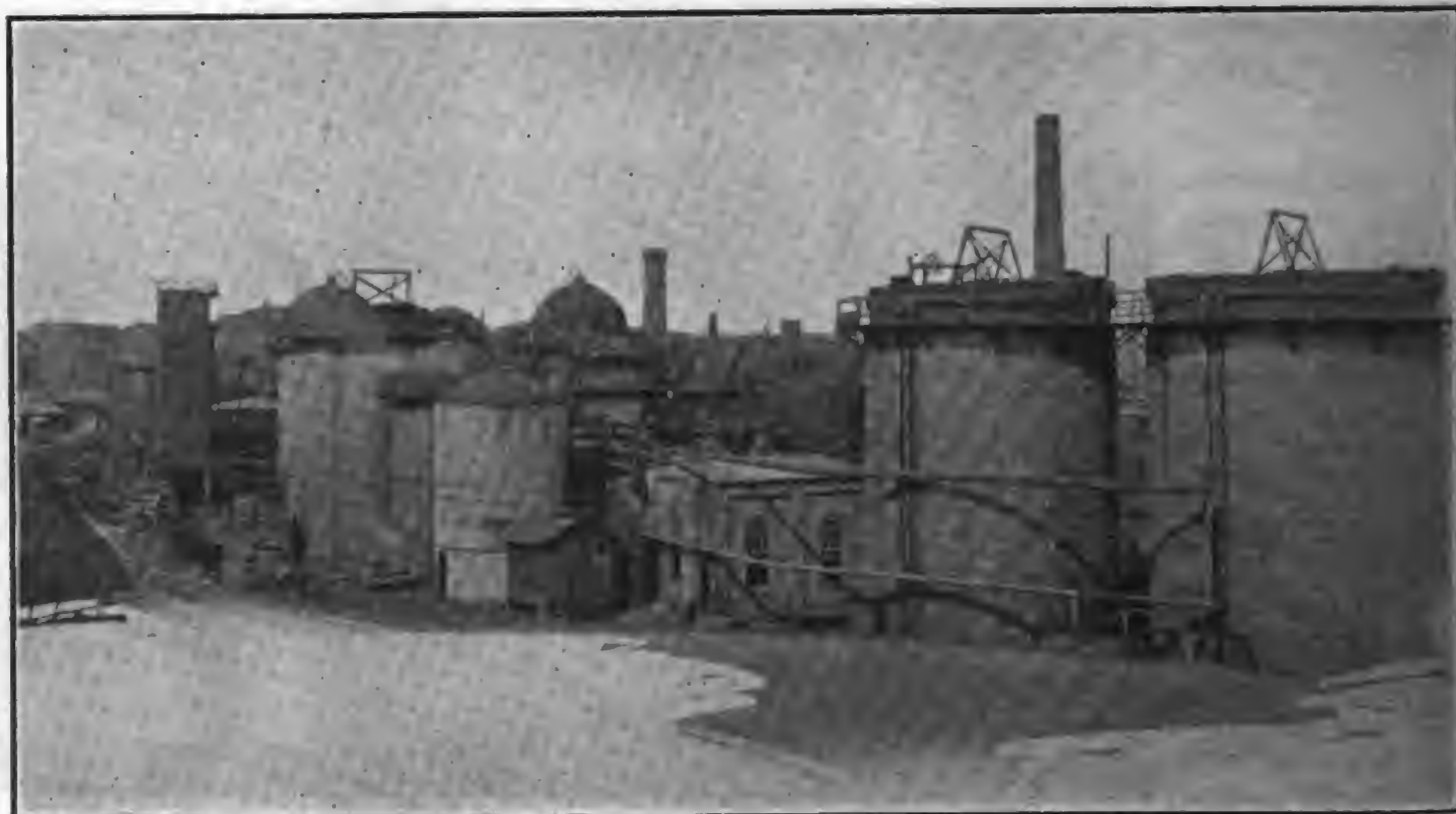
That "oil spring" which George Washington found in western Virginia and by his last will called to the special attention of his trustees, was the fore-runner of a continental well which last year yielded 356,000,000 barrels of crude oil. And each year the prophecy that it had reached the peak of its possible output has been refuted by a continually increasing yield. The story of crude oil, the base from which a large proportion of the world's supply of gasoline is obtained, is full of human interest. Its use by man dates back to the dawn of history. The mortars found in the ruins of Nineveh and Babylon were made from it. The Mound Builders of North America are known to have dug numerous oil wells, while the Indians collected and used it as a curative agent.

Rock oil, as it was called, was known to the earliest settlers of certain parts of Pennsylvania as it oozed from the earth and was seen floating on the surface of ponds and streams. By these early settlers rock oil was considered a nuisance, as it made the water unfit for

drinking or domestic purposes. Later, following the example of the Indians, small quantities were collected and sold under the name of Seneca oil for medical purposes. About 200 years passed from the time of its discovery by white men in Pennsylvania before its incalculable value to the human race began to be appreciated.

About 1859, when the possibilities of crude petroleum as a valuable product had been determined, and the first oil well had been successfully sunk near Titusville, Pa., there was a blaze of excitement throughout the country and a rush to the oil districts ensued, equalled only by the frenzy of the 49'rs when gold was discovered in California. The streams of natural oil gushing from the wells proved to be streams of liquid gold. The owners of a few barren acres of land awoke to find themselves millionaires over night.

The number of products derived from crude oil are legion, each year making additions to the already long list of by-products which chemists have found can be reclaimed from the residue of crude oil refining. Among the list of well known petroleum products, in addition to gasoline, kerosene and similar fluids already mentioned, are included lubricating oils, greases, petrolatum, paraffin



Lubricating Oil Might Be Spoken of as a By-Product of Gasoline—These Agitators Contain Several Different Grades of the Oil (See Text).

wax, etc. Each of these principal products are divided into hundreds of different grades, according to their physical and chemical characteristics and the purpose for which they are to be used, being shipped to all parts of the world wherever an automotive vehicle is operated, a lamp burned or a wheel turned.

The Modern Mammoth Refinery.

The modern refinery which handles this crude oil as it comes from the earth is an immense aggregation of mammoth stills, filters, storage tanks, steam and power plants and laboratories. Immense work shops are required to manufacture the hundreds of thousands of barrels, boxes and tins in which its many products are shipped. Its working population is equal to that of a large town. The crude petroleum as received through the pipe lines from the fields is subjected to many intricate processes and careful tests before it is rendered fit for use in internal combustion engines.

The following description of the processes of refining crude oil as practised at the extensive works of the Tidewater Oil Co., Bayonne, N. J., considered as one of the representative producers of petroleum products of the country, may be of interest as typical of the industry today. Carefully read in connection with the accompanying diagrams and illustrations, supplied through the courtesy of the Tidewater Co., this account will be found not only entertaining, but instructive as well.

Process of Refining Crude Oil.

From the time that the first oil well was sunk near Titusville, Pa., in 1859, as before stated, the production of petroleum has gone steadily forward until it is now recovered in practically every country in the world, its properties varying widely with its source. The gravity ranges between very heavy and very light, the latter being what is commonly used as motor gasoline. The color varies between water white to jet black, with solidifying points ranging from zero to over 100 degrees Fahrenheit.

Crude petroleum is a highly complex mixture of the compounds of hydrogen and carbon. Chemically, it consists of approximately 80 to 88 per cent. hydrogen, the impurities in it consisting principally of sulphur compounds, oxygen, nitrogen and metallic salts. Crude oils may be divided into three main families, having paraffin, asphaltic or cyclo-naphthene bases. There is no sharp line of demarcation between these groups, as most crude oil found in all fields contain mixtures, in variable amounts of hydrocarbons, belonging to two or more of these families.

After being pumped from the oil fields the crude petroleum is conveyed through a pipe line and deposited into storage tanks of large capacity. The semi-solids which settle from the crude product consist of amorphous paraffin wax, mud or other earthy foreign matter and impurities.

To more conveniently and intelligently describe the process, the refining of all crude oil may be divided into two general stages.

Separation Into Groups by Distillation.

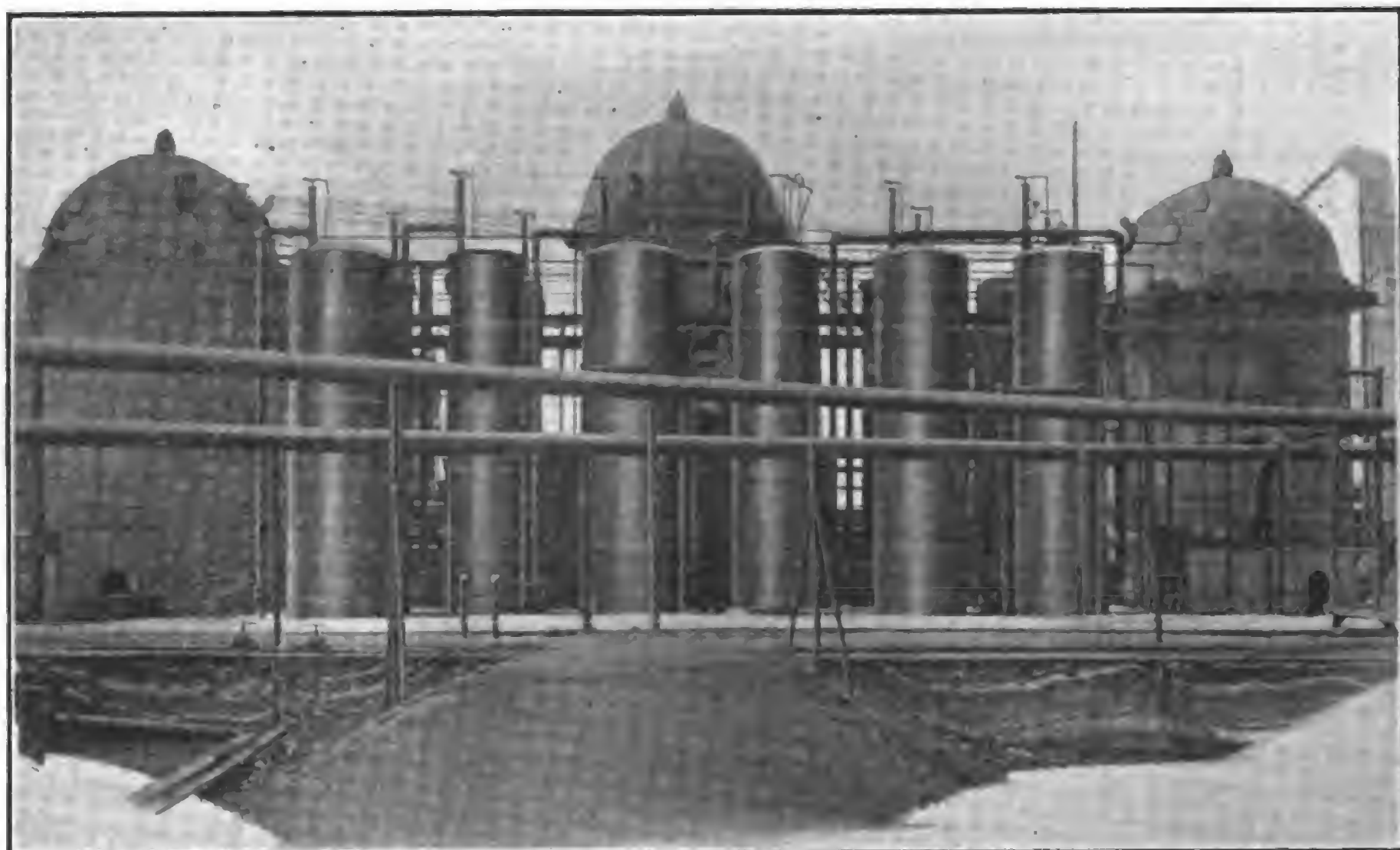
The first step in the refining process is the pumping of the crude petroleum into a large cylindrical boiler called a crude still. When this tank is filled to a certain level, fires are started underneath and vaporization and distillation commence. Distillation, as applied to hydrocarbon oil, is the separation of the more volatile portions from the less volatile by vaporization, later condensing them by passing the hot vapors through cooled tubes. Light hydrocarbons, such as gasoline, vaporize very readily, while heavy oils form practically no vapors at atmospheric pressure and temperature; therefore, it is necessary to heat and boil crude petroleum in a closed vessel in order to accomplish the complete vaporization and separation of the different hydrocarbons. As crude oil is a complex mixture of hydrocarbons, each of which has a different boiling point, a different temperature is required for the vaporization of each compound. Dissolved gas and the lightest hydrocarbons pass over

different sections of the aerial condenser, fall back into corresponding collector pans, each leading by way of a separate water-cooled coil to the storage tanks, called running tanks. The liquids recovered in the collector pans are still at a temperature above their fire points, and it is necessary to cool them down to prevent spontaneous ignition when they come into contact with the air in the running tanks.

Distillation continues until a residue (crude cylinder stock) of about 15 per cent. remains, when the fires are drawn and the remaining oil is pumped from the still through a cooler into a running tank.

Separation and Finishing the First Groups.

The prime object of the second stage is to subject the group distillates from the running tanks to a different process to further separate each group into the final market form of the products which each contain. The secondary purpose of refining is to remove the impurities, the



This Battery of Agitators Is Used for the Continuous Treatment of Gasoline.

first, and as the temperature is increased, heavier and heavier hydrocarbons are vaporized.

The vapors thus formed are led through a pipe from the still and discharged into the base of an aerial tower condenser. From here they pass through alternate boxes and air-cooled tubes, where products of different boiling points are simultaneously condensed and automatically separated into groups. The lightest products pass completely through the tower and flow in a vapor form to a water-cooled condensing coil where all the light hydrocarbons, condensing without the application of pressure, are liquefied and separated from the remaining vapors, which are further treated at a compressor plant for the separation of the very light hydrocarbons from the fixed gases. Of the remaining vapors the heaviest condense upon striking the first air-cooled tubes and the lightest upon striking the last tubes. The intermediate products, lying between the light and heavy ends, condense in the intermediate tubes, depending upon their respective boiling points. The vapors, liquefying in

color-bearing and unstable or unsaturated compounds and free carbon. It may be well to point out at this time that in the first group distillation there is no sharp line of demarcation between gasoline and illuminating oil or between other similar fractions. The heavy constituents are mechanically carried over with the light portions and the more volatile products are mixed with the heavy parts. In order to completely separate these, further distillation is necessary, and is called "reducing."

The crude gasoline distillate is pumped from the running tank to an agitator, where it is treated with sulphuric acid, washed with water to remove the free acid and neutralized with caustic soda, again washed and separated from the water. The treated gasoline is next sent to a steam still, where it is divided by distillation into the various market grades of gasoline and then pumped into the finished gasoline storage tanks.

The crude illuminating distillate is pumped to a steam still where the crude gasoline contained in it is separated by distillation and sent to the crude gasoline

agitator. The illuminating oil remaining is sent to an agitator where it is treated with acid, washed, neutralized, rewashed, filtered through fuller's earth and pumped into the finished kerosene storage tanks.

The crude lubricating distillate passes from the running tank to a steam and fire still, for the purpose of changing (by heat) the character of the paraffin wax from its amorphous condition to a wax that may be crystallized. Some fuel oil may be taken off here. The lubricating distillate then passes to the agitator, where it is given an acid and alkali treatment and is thoroughly washed with water. From the agitator it goes to a chilling tank, where its temperature is

From the still the oil is sent to a tank where it is blown with air to remove all traces of moisture. After this air-drying process the cylinder stock is pumped into the finished storage tanks.

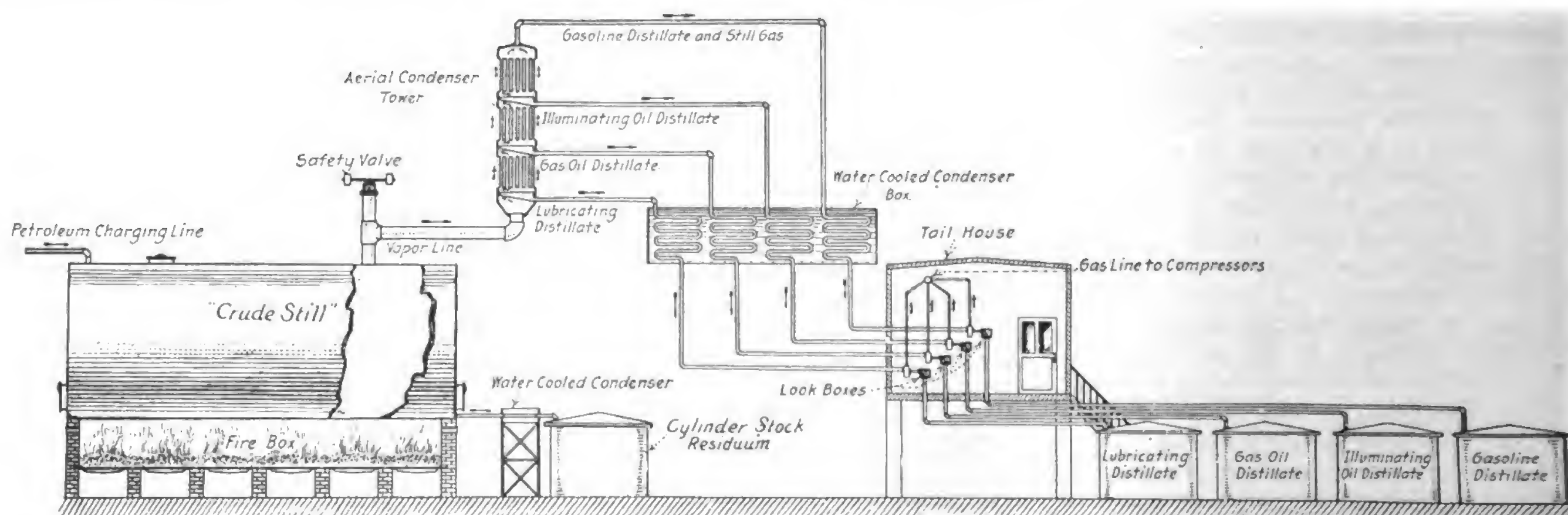
Oils manufactured from the lubricating distillates of the paraffin base of crude petroleum are usually not heavy enough for the heavy and extra heavy grades. It is therefore necessary to blend these filtered "straight-run" lubricating oils with highly filtered low cold test cylinder stock of extremely heavy body to produce the oils of heavy and extra heavy body required in some types of internal combustion engines.

The petrola settled out of the cylinder stock is blended with more naphtha to

Gasoline is not a substance that can be characterized by any definite physical or chemical limits, such as can be used to describe water or sugar, but is a reasonably volatile mixture of hydro-carbons which is used chiefly as motor fuel. These hydro-carbon mixtures are exceedingly complex. The possibilities of their variation in their physical and chemical properties are many. The properties generally considered are:

Volatility—The ease with which gasoline vaporizes, which is measured in terms of the boiling points of the various component parts of the gasoline.

Purity—Freedom from water, sediment, acid, sulphur and other elements not hydro-carbons.



This Chart Shows in Detail First Stages of Refining Petroleum—Although It Appears Intricate, Careful Study Makes It Plain.

lowered to such a degree as to cause the crystallization of the wax.

In this chilled condition it is pumped to a wax filter press, under high pressure, where it is separated into crude scale wax and pressed lubricating distillate. The pressed distillate next goes to a steam and fire still, where the gas oil is separated. The remaining distillate is then divided by fractional distillation into lubricating oils of different viscosities, varying from very light to medium. The next step in the treatment of these oils is to pass them through a fuller's earth filter for the removal of the color-bearing compounds and free carbon. From the filter these oils are pumped in to the finished lubricating oil storage tanks.

The crude scale wax is sent from the wax filter press to a sweater, where it is separated into scale wax and oil (foots). The scale wax then goes to a fuller's earth filter through which it passes to the finished paraffin wax tanks.

Crude cylinder stock, being very viscous and difficult to handle, is greatly thinned down by mixing it with blending naphtha, and the solution is then sent to a chilling tank where the amorphous paraffin wax (crude petrola), from which vaseline is manufactured, settles out. This separation of petrola from all grades of oil has the effect of lowering the cold test. The cylinder stock naphtha solution is separated and pumped into a fuller's earth filter for the removal of the color-bearing compounds and free carbon. From the filter it passes on to a steam still where it is separated into naphtha and low-test cylinder stock.

sufficiently reduce its viscosity for easy filtration. The petrola solution is then filtered through fuller's earth, or charcoal, and next separated in a steam still into blending naphtha as a distillate and filtered petrola as a residuum.

Composition of Gasoline.

Gasoline is a physical blend of hydro-carbons all of which are sufficiently volatile, when finely atomized, to form an explosive mixture with air in the proper proportion. The characteristics of the crude oils found in different localities vary widely, hence gasolines made from them do not closely resemble each other, although to the layman they look very much alike. Strange as it may seem, this colorless, mobile fluid consists of a mixture of numerous compounds composed of carbon—familarly known as carbon black—and hydrogen, the very light gas with which some high altitude balloons are inflated. When properly burned the carbon forms carbonic acid gas (soda water gas) and the hydrogen water, seen often in winter as steam condensing as it leaves the exhaust.

There are many other substances which contain only carbon and hydrogen, which are not gasoline, and would not make good motor fuel. For example, artificial camphor balls. The laws of nature and mechanics dictate that only compounds, like hydrogen-carbon compounds which are derived from petroleum, possess the necessary characteristics for quick, clean, simple combustion so necessary for right behaviour in the automotive engine. Crude petroleum is the only known source of these compounds in commercial quantities.

Calorific Power—The heat liberated when burned. Calorific power is expressed in the number of British thermal (heat) units per pound of material.

Refinement—Freedom from undesirable portions of crude petroleum that should be removed by the refining process, such as unsaturated compounds like those related to the asphalts.

Gravity—Sometimes spoken of as "test," is misleading. It is merely an arbitrary method of expressing the comparative weight of the liquid.

Essential Elements of Good Gasoline.

Contrary to the popular belief, no one physical test can determine the suitability of gasoline as a motor fuel. Baume's gravity principle, which was relied upon for years to indicate the quality of motor fuel, is misleading. For this reason it is omitted entirely from the motor and aviation gasoline specifications of all the United States government departments, and from the specifications of most large buyers. An example of the misleading nature of the gravity test is shown in the fact that kerosene and "casing head" naphtha can be mixed in proportions to give a high gravity test. The resultant product is a poor motor fuel, however, but measured by gravity it will test higher than a high-grade gasoline. Tests of this kind are misleading to the layman who considers that all so-called gasolines of this gravity will run his engine satisfactorily even if the price is low.

Volatility.

The most essential property of good gasoline is its ability to change from a liquid to a vapor quickly. This is termed

(Continued on Page 661.)

Federal Aid for Road Building Now Available

*Average Cost of Roads, One-Third of Which Are
Already Finished, Was \$17,500 a Mile—Will Con-
tinue to Provide Work for Quarter Million Men.*

SEVENTY-FIVE million dollars becomes available as federal aid for road construction in the various states, the money to be spent under the supervision of the Bureau of Public Roads, Department of Agriculture, under the Federal Highway act, recently signed by the President. In addition, \$15,000,000 is appropriated for national forest roads. The \$75,000,000 represents the federal government's appropriation to the work of building highways in the various states and must be matched, dollar for dollar, by funds from the state treasuries, except in states where more than five per cent. of the area is unappropriated public land.

THE \$75,000,000 appropriated is for fiscal year ending June 30, 1922, and \$25,000,000 of the sum is available immediately, the balance becoming available on Jan. 1, 1922. The table shows how the money will be apportioned among the 48 states.

improvement with federal aid. This system will be divided into two classes, one of which will be known as inter-state highways and the other as inter-county highways. The inter-state highways must not exceed three-sevenths of the system selected; on them not more than

ture will maintain it out of the state's allotment and refuse to approve any new projects until reimbursement is made by the state.
What the new appropriation will mean to the country can be judged by the use to which the \$275,000,000 previously ap-

State	Allotment	State	Allotment	State	Allotment
Alabama	\$1,553,420.67	Maine	\$695,160.25	Ohio	\$2,823,004.05
Arizona	1,053,281.44	Maryland	640,629.01	Oklahoma	1,752,339.44
Arkansas	1,254,142.20	Massachusetts	1,096,176.04	Oregon	1,182,663.90
California	2,462,098.53	Michigan	2,249,532.43	Pennsylvania	3,398,953.97
Colorado	1,341,175.69	Minnesota	2,123,597.07	Rhode Island	365,625.00
Connecticut	480,897.73	Mississippi	1,294,906.22	South Carolina	1,661,237.34
Delaware	365,625.00	Missouri	2,448,128.62	South Dakota	1,204,060.31
Florida	856,825.69	Montana	1,546,865.82	Tennessee	1,647,692.24
Georgia	1,997,957.58	Nebraska	1,581,189.50	Texas	4,425,172.41
Idaho	938,536.68	Nevada	953,436.78	Utah	849,417.21
Illinois	3,246,281.07	New Hampshire	365,625.00	Vermont	365,625.00
Indiana	1,958,855.41	New Jersey	942,870.95	Virginia	1,456,828.47
Iowa	2,102,872.74	New Mexico	1,189,823.34	Washington	1,103,709.77
Kansas	2,102,281.51	New York	3,696,447.97	West Virginia	802,359.77
Kentucky	1,417,178.68	North Carolina	1,709,333.90	Wisconsin	1,894,815.86
Louisiana	996,989.64	North Dakota	1,164,714.42	Wyoming	934,617.63

Of the appropriation of \$15,000,000 for the improvement of national forest roads, \$5,000,000 is made available for the fiscal year ending June 30, 1922, and \$10,000,000 for the following fiscal year.

The Federal Highway act in a general way resembles the Federal Aid act of 1916, but contains several new features. The administration of the act by the secretary of agriculture, and under him by the Bureau of Public Roads, remains unchanged.

The apportionment of the fund to the states is almost the same as in the previous act, the fund being divided into three parts, one part to be distributed according to population, one according to area and one according to its mileage of the rural and star mail routes. A new feature is the stipulation that no state shall receive less than one-half of one per cent. of the total fund which, in this case, amounts to \$365,625. This stipulation will increase the amount received by four of the smaller states, i. e., Delaware, New Hampshire, Rhode Island and Vermont.

Change in Use of State Allotments.

There is considerable change, however, in the manner in which a state may use its allotment. Each state must select a connected road system, not exceeding seven per cent. of its road mileage, for

60 per cent. of the state's allotment can be spent without the joint approval of the secretary of agriculture and the state highway department. The inter-county highways, which consist of the remainder of the system selected, will receive the remainder of the state's allotment.

Except in states where more than five per cent. of the area is unappropriated public land, the amount of federal aid received on any project must not exceed 50 per cent. of the estimated cost. In states where more than five per cent. of the area is unappropriated public land the 50 per cent. allotment is increased by an amount equal to one-half the percentage of unappropriated public land in the state. Before any funds can be paid to a state, the state must appropriate money, under the direct control of the state highway department to match the federal allotment, and for the maintenance of federal aid highways.

All highways in the inter-state system must have a surfaced width of at least 18 feet, unless a narrower width is deemed permissible by the secretary of agriculture. In case a federal aid highway is not properly maintained by a state, the state will be given 90 days' notice by the department; at the end of that time, if the highway is not in a good condition of maintenance, the secretary of agricul-

propriated has been put, according to officials of the United States Department of Agriculture. Practically \$200,000,000 of that money has been put to work in projects which are either entirely completed or now under construction. The exact amount was \$199,823,427 on Oct. 31. To match this amount the states have appropriated \$265,529,090, making a total of \$465,352,517.

Mileage Sufficient to Encircle the Earth.

The roads to be paid for by this money, if placed end to end, would encircle the earth and extend from New York to San Francisco on the second lap, the total mileage of the roads under construction and completed being reported by the Bureau of Public Roads as 27,000 miles on Oct. 31. Of this mileage 9555 miles are in projects which are entirely completed and the contractors discharged. The balance of 17,445 miles is in projects which are still under construction, but which were 69 per cent. completed on Oct. 31. In these projects there is therefore the equivalent of 12,000 miles of completed road, so that the completed road to date totals over 21,000 miles.

The average cost per mile of the roads built with federal aid has been between \$17,000 and \$18,000. Various types of roads have been constructed and results thus far accomplished have been good.

Will Keep State Roads Clear of Snow

Smallest State in Union Marshals Efficient Force of Snow
Fighters in Avowed Attempt to Keep Highways
Open to Motor Traffic.

RHODE ISLAND, the smallest state in the Union, has set a pace for snow removal during the next few months, that few if any of the larger states can follow in the matter of keeping the highways clear. Already its fleet of 45 automotive snow plows, augmented by several tractors for emergency service, is lining up to charge the enemy and Chief Engineer Irving W. Patterson of the State Roads board has shown his appreciation of the trend of modern progress by stating that "keep the roads open," means that the snow must be removed to a degree that will make motor travel not only possible, but comfortable as well. In the old days a few struggling teams of sweating oxen waded belly deep through the snow drifts towing a drag. Reinforced by hand shovels they did their feeble bit to open up the highways to sled travel, and the roads so treated were officially declared "open." This work was formerly done by the different communities and towns, but all this is changed now and the work will be done by the State Board of Public Roads and the state has been divided into six districts, with a base of operations in each district. Division engineers have charge of each and these men are under the supervision of H. M. Pickersgill, superintendent of mechanical equipment, who will direct the operations in accordance with a carefully thought-out plan. At the present time this force numbers 150 men, but when snow removal work begins many more will be employed.

Many of the trucks of the State Road board have been employed during the past summer on various road maintenance jobs throughout the state, thus enabling the board to keep a certain number of men busy the year round, this force to be materially increased for snow

removal work. It is planned to man each truck with three men besides the driver and an extra driver. The automotive snow plows and men are subject to call by telephone or messenger at any hour of day or night. Starting work with the first fall of snow, they stop only when the storm stops and the roads are open for travel.

three months of the year that the state roads are usually practically impassable for other than horse-drawn vehicles.

The General Assembly at its last session amended the motor vehicle act by substantially increasing the registration and license fees of motor vehicles. At this session it also provided that a certain portion of this money should be



Crawler Type of Tractor-Truck, with Sled Runners Forward, Clearing Country Roads—Tractors Will Play an Important Part in Plans of State Roads Boards.

The government distribution of motor equipment enabled the state to acquire a sufficient number of trucks, tractors and extra equipment to start the work of snow removal this year and the work once begun will go a long way toward stimulating the operation of motor vehicles all winter by persons who heretofore have laid up their cars during the

used for the removal of snow and ice.

Rhode Island is traversed by a through trunk line of travel, running north and south, connecting with additional feeder lines running east and west. This location forms virtually a narrow lane through which pours, throughout the year, a multitude of passenger car and motor truck traffic. During the winter months, or snow season, this trunk line and its feeders are used heavily for transporting interstate as well as local freight from the multitudinous industrial plants of the state, which are largely devoted to the manufacture of cotton goods and machinery. These are shipped to many points in New England, as well as to New York state and other points south and west. Many of the mills are located at a distance from tidewater or railroad freight shipping points and it is necessary that the coal and raw materials be hauled overland. This alone requires many trucks and the highways must be kept in passable condition.

In the northern part of the state are located a number of cotton and woolen mills, rubber goods manufactories and other industries. It is necessary that a large portion of their finished product be driven over the road to tide water for



Two-Wheel Type Road Maintainer Offers Effective Means of Clearing Drifts from Highway—This Machine Is Said to Meet the Need of Country Road Commissioners.



Truck Equipped with Front Snow Plow Proves Capable of Opening Up the Long Stretches of Highway—Rhode Island Has 45 Machines of This Type.

shipment by boat. A large number of motor trucks are engaged in this haulage service, many of which are owned and operated by the manufacturers. This large amount of tonnage in itself makes it necessary for the state to make every effort to keep its main lines of travel open in winter to prevent any tie up in traffic that might work a hardship both for the manufacturer and his employees.

Traffic from Boston Heavy.

Goods are shipped by motor truck from Boston, Worcester and points north through Rhode Island to New York, Philadelphia and southern points throughout the winter months. A number of truck companies maintain regular weekly schedules between various points, soliciting freight from the towns and cities through which they operate. It is highly important that these trucks be kept in operation intermittently so as not to stifle industry. This fact the State Roads board realizes and it is planning to bend every effort to keep the main lines of travel "open" regardless of the weather or the amount of snow which falls.

Tractors as Second Line of Defense.

Chief Engineer Patterson of the State Roads board reports that plans already formulated call for the use of tractors as a "second line of defense" in unusual falls of snow when it is impossible to make proper headway with the automotive snow plows. Three Holt crawler type tractors form this equipment, each hauling a special type of plow designed to clear a wide strip of road. They are also to be used to assist the trucks in deep snow and for smoothing down the ridges left by the trolley companies after cleaning their tracks. It is well known that the crawler type tractor is best adapted for operating over snow-banked roads and that it is able to perform creditably where other means fail, so that the board feels that, with this equipment held in reserve for use in connection with the automotive snow plow outfits, it will be able to cope with practically any condition that may arise and be able to keep

traffic moving during the hardest storms.

In looking ahead and figuring the work to be done, Chief Engineer Patterson feels that there will be several problems that will require solving. There are several towns in which the trolley tracks run between the gutters and sidewalks

PROTESTS RATES.

THE New England Farmers and Live Stock Dealers, Inc., at its monthly meeting in the American House, Boston, voted to send H. E. Thompson of Plainville, Mass., the secretary, with a resolution to the Interstate Commerce commission in Washington, D. C., protesting against the rates for live stock charged by the railroads. President W. A. Ricker of St. Johnsbury, Vt., presided. About 50 members attended.

or in the center of narrow streets, necessitating the trolley companies scraping the snow from their tracks into the gutters. This will call for extra work on the part of the State Roads board in that it will probably mean that, in plowing with the automotive snow plows two lines of travel will have to be kept open with a snow ridge pushed into the center of the street between them, there to remain until it melts or is carted away.

The truck and tractor equipment received by the State Roads board is that which was recently allotted to the state by the government. The machines have all been overhauled and put in first-class order. After Dec. 10 it will be taken from the road maintenance depart-

ment, equipped with plows and held in readiness for snow clearance service. The plan is at present to start the automotive snow plows at the first snow fall, keeping them going day and night until the storm is over, employing two shifts of men, if necessary, and to move two or three inches of snow a trip, giving each truck an average 10-mile or shorter trip, depending upon the fall of snow.

The equipment mentioned compares very favorably with that possessed by other states having less travel to contend with, but possibly a greater mileage of truck lines and, unless unforeseen difficulties arise, Rhode Island's through truck lines and feeders of travel will be better cared for than ever before, the motor truck drivers will be able to make nearly as good time in transporting freight as on bare ground. The industries of the state will not be crippled for the want of raw material or in the delivery of finished products and the motorist may well feel proud that, by contributing a little bit more in the way of fees to the state, he along with his friend, the truck owner, is able to reach his destination on time without wallowing through snow banks.

Farmers using trucks also appreciate this work of the State Roads board, as it enables them to reach market as usual with their farm products without spending weary hours on the road.

The plans of the State Roads board of Rhode Island and the method of using the equipment might well be copied by other states which also have this problem to solve.

EVENLY ADJUSTED BRAKES.

Properly adjusted brakes and clutches constitute one of the short cuts of tire economy. Motor vehicle owners frequently find upon investigation that one brake band grips more tightly than the other. When this condition prevails the task of stopping the car will fall upon the wheel with the tighter brake. This will cause the rear tires to wear unevenly and the owner will perhaps be at a loss to explain why one casing gave him so much less mileage than another.

Sometimes improperly adjusted brakes will be found on a new car. But more often this condition follows the taking up of the brake bands to compensate for wear. If this task is not properly done, one band will be tighter than the other.

TO SELL MUTUAL TRUCK.

SULLIVAN, IND., Dec. 15.—The Mutual Truck Co.'s plant and equipment here will be offered at public sale by the receiver Dec. 22. The sale will include 12 acres of land with siding to the C. & E. I. and Illinois Central railroads, a large modern brick building with steel truss roof; heating plant, machine tools, drawings, blue prints and a miscellaneous stock of materials and parts for building a 2½-ton motor truck. The First National bank of Sullivan is the receiver and E. D. Maple the trust officer in charge. Those who have inspected this plant are unanimous in stating that it is a very desirable piece of property.

Chickens (Feathered Kind) Enjoy Motoring

ENSCONCED in their commodious sleeping quarters an even dozen blooded White Leghorns are motoring through New England. An ingenious truck body built on a light chassis provides the de luxe hen house.

THE idea was worked out by the Henshaw Motor Co., Boston dealer, when the Charles M. Cox Co., which distributes Wirthmore poultry feed, broached the subject. The truck body built was fitted out to allow elbow room for 12 hens and make a complete display of various grains, besides providing sleeping quarters for two men. The front part of the truck carries a dozen blooded White Leghorns, exposed to view, and a glassed-in partition on either side of the truck, divided into 18 compartments, openly displays as many varieties of grain foods.

With this complete outfit the salesman simply drives into the farm yard and prepares for a complete demonstration of the comparative values of the various



Manufacturer of Poultry Feed Uses Dodge Truck Effectively to Advertise Product. This Is Only One of Many Uses Found for the Light Commercial Vehicle.

kinds of scientific feeds for live stock and poultry. Thus expert attention can be given to the particular needs of every farmer.

In addition to the sleeping quarters for two men the truck carries a full supply of cooking utensils and equipment

necessary for camping along the route. A tent serves as an auxiliary rest room.

This unique truck, which is an excellent illustration of the wide variety of uses to which the light chassis is adaptable, is booked to visit fairs and exhibitions all over the country.

Oshkosh "Store-At-Your-Door" Delivery

OSHKOSH MOTOR TRUCK MANUFACTURING CO., Oshkosh, Wis., is showing one of its latest Store-at-Your-Door bodies mounted on an Oshkosh truck chassis. Five of these jobs have recently been delivered to the U-Save-It Stores Co., Dayton, O., which operates trucks of this type throughout the city and surrounding country.

The customer enters through the door at the rear, reached by the step at this point. The interior is fitted with shelving on both sides with an open aisle passing through the center. After the customer selects the goods desired he passes by the driver, who is also the cashier, out through the front door. The

interior and exterior of the car are finished alike in white enamel and are constructed along strictly sanitary lines. The ice box may be seen through the cab window in the rear of the driver's seat, while the cash register is mounted at the side of the seat.

The store bodies are built by the J. L. Clark Manufacturing Co., Oshkosh, Wis., and are mounted on the regular Oshkosh Model BB 2½ tons chassis, fitted with pneumatic equipment. The stores were delivered overland from Oshkosh to Dayton in approximately 30 hours' running time.

The company feels that the field for this type of delivery is large, as much

time is saved both the customer and dealer, and the customer has an opportunity of selecting the goods desired without telephoning for the goods or waiting for delivery.

Larger purchases are thus assured by this method, while the heavy item of overhead in operating a regular store is eliminated, as one man with a travelling store is able to average as much in cash sales as three men in the regular grocery business.

TIRE TRADE GAINS.

AKRON, O., Dec. 12.—The Industrial Bureau of the Chamber of Commerce in a recent report on the tire industry in Akron indicates that the 1921 business of most of Akron's tire companies is today fully 33 1/3 per cent. ahead of the volume of business of this time last year and that this increase has been brought about without the use of any so-called "emergency" methods, or without going outside of the usual channels of trade to get business.

"The actual consumption of automobile tires steadily is increasing, and Akron's tire factories are now larger, employing more men and producing more goods than they did before the war," continues the report. "The General Tire & Rubber Co. affords an example of the stability of the tire industry despite its recent depression. The company reports that at no time have sales been lower than 60 per cent. of peak figures.

"Akron today is a bigger, sounder city than when the war began."



No Excuse for the Housewife Not Having a Full Larder When Service Such as This Is Available—The Field for These Rolling Stores Is Large.

Designed for Speed Trucks

National Worm-Driven Axle Said to Meet with Approval of Manufacturers Who Use It Extensively in Building High-Priced Vehicles of Light Capacity.

NATIONAL AXLE CO., Benton Harbor, Mich., announces that it is in production with a worm-driven axle unit, especially designed to meet the requirements of three-quarter to one-ton capacity speed trucks, known as the National worm-drive axle, type 100. National axles are stated to be constructed throughout of the very best materials obtainable, by improved methods of manufacture in large quantities at a time, enabling the company to offer the trade an up-to-the-minute axle product, having a minimum carrying capacity of 3500 pounds, at a cost that makes possible its use in medium-priced trucks up to one-ton capacity.

The worm-driven axle is noted for its silent operation, its popularity increasing yearly as owners realize the advantages of this method of drive. Low cost of up-keep, long life and satisfactory every-day service are but a few of the predominating features in its favor. It is this type of axle that is used extensively by manufacturers of the highest priced and best known trucks.

THE driving shafts of National axles are drop-forged special alloy steel, heat treated, retreated and accurately ground to proportions which aim for a uniform stress throughout.

The housing is a one-piece casting, box shaped, thoroughly reinforced, sand blasted to remove all rough scale and free from blow holes and shrinkage cracks. These castings are machine moulded and have a uniform thickness at all points.

The worm wheels and alloy steel worms are carefully ground to accurate size, the special alloy steel bronze wheels giving maximum wear with minimum friction. All worms and worm wheels are tested on a special machine by which the center distance can be measured accurately, each worm with a master wheel and each wheel with a master worm so that they are interchangeable.

National differentials are of the four-pin type fitted with drop-forged gears and spiders. The gears are of special alloy steel with heavy stub teeth, with all bearing surfaces hardened, ground and provided with oil grooves.

The bearings of the axle unit are Timken tapered throughout, provided with take up for wear. The worm and worm wheel, together with the differential, are mounted as a unit on a one-piece casting which forms the cover of the case, allowing the worm, worm wheel and differential support bearings to be removed as a unit in case of repairs.

The brake equipment consists of two pairs of brakes, both internal expanding, which provide an unusually large amount of braking surface for each size of axle. Special felt grease retainers are fitted at all openings to prevent oil and grease from seeping from the housing, while provision is also made to prevent dirt or dust from entering the bearings.

Special attention has been given to the lubrication of the worm and worm wheel, an oil groove being cast in the side of the worm mounting casting which carries the oil direct in a continuous stream to both worm shaft bearings. A plug is placed in the bottom of the housing for

drawing off the old oil and for removing sediment that may have settled at the bottom of the housing. An intermediate

STRANGE!

NO HORSES have been stolen in Dedham, Mass., in 1921, according to the report made at the 111th banquet of the Society in Dedham for the Apprehension of Horse Thieves, which hasn't yet decided to devote its attention hereafter to the apprehension of automobile thieves.

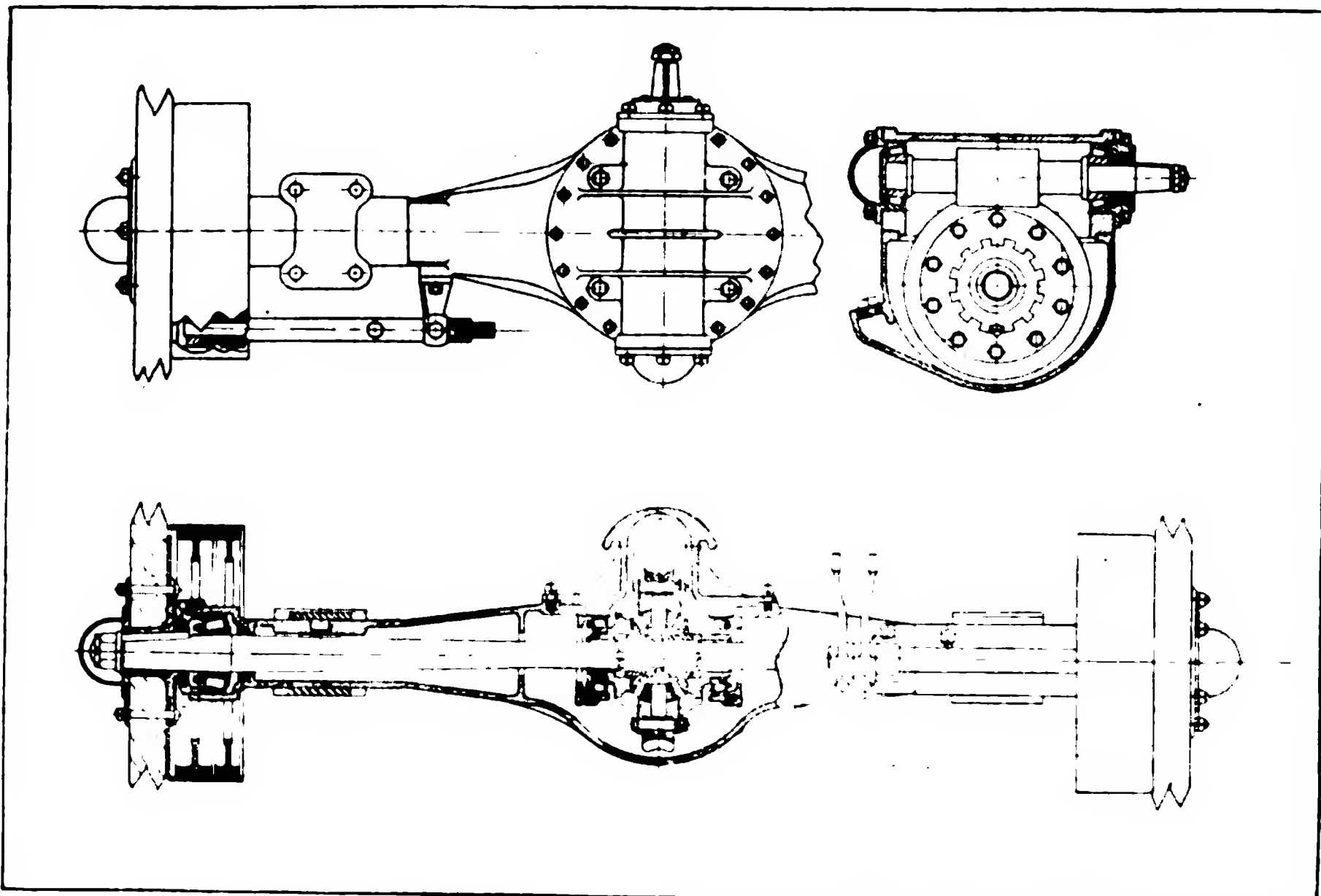
plug is provided, called the "danger oil level plug," which is located a little below the oil filling plug, and the oil in the

housing should not be allowed to get below this opening. The top or filling plug determines the proper height to which the oil should be filled.

Gear ratios available in this axle are as follows: Five to one, 6.1 to one, 7½ to one and 8 2/3 to one. The centers are six inches apart, the thread 56 inches, the spring centers 34 inches minimum and 40 inches maximum for three-inch springs. The spring clip holes, front and back, are 4¾ inches apart.

TRUCK TIRES REDUCED.

AKRON, O., Dec. 11.—The Goodyear Tire & Rubber Co. recently cut the prices of motor truck tires, following the company's recent cut in automobile tires. Fifteen per cent. has been cut on all Diamond Tread solid tires, 10 per cent. on Pneumatic truck tires, 10 and 15 per cent. on pneumatic truck tubes, six per cent. on smooth, solid tires and 10 per cent. on cushion truck tires.



Showing Construction of National Worm-Driven Axle—This Efficient Unit Has Been Developed to Meet Demand of Manufacturers for a Light Worm-Driven Rear Axle.

TRUCK TALK

ONE THOUSAND MILLION DOLLARS is now available for farm development and as might be expected, the insidious horse booster has seen what appears to be a fine opportunity to make a pretense of earning his salary, and firmly grasping his stubby pencil is laboriously fashioning his misleading propaganda in an endeavor to sell horse-drawn implements.

Surely the horse is not to be congratulated on the class of publicity accorded him by these avocationists of the printed word, and many an honest equine, were he educated even to the limited extent of the dictionary hunters who speak for him, would hang his head in shame on reading the misleading "information" that is handed out regarding his superior achievements and qualities. No team of horses ever heard of could compete with a motor truck in the marketing of farm produce. These horse boosters know the truth—but how carelessly they handle it.

FOR instance, "Farmer So-and-So declares he is done with trucks. He wants no more of them, and as soon as this one wears out he's going to buy a good honest pair of Missouri mules."

Or this, "Farmer Such-and-Such is glad to see that the price of 'hoss-feed' has dropped. Now he can sell off that motor truck that has been bothering him so much and get back to horses."

A lot more similar dissimulate "guff" is also disseminated. All wrong. Not worthy the casual glance of the school boy, because this sort of stuff is of fabular inception.

The truth of the matter is quite the opposite. No farmer will say that the motor truck is not one of the best investments he ever made. An example of the part that the commercial vehicle really plays in the life of the farmer is shown by the following facts:

This writer recently was privileged to talk with an elderly lady who has spent the best years of her life on a farm. Of superior education, she married a hustling going farmer, some 35 years ago. At the present time she is in the late 60's and both she and her husband have decided to rest for the balance of the life that is still allotted to them. They have turned over the old farm to their son and he is doing well with it, thanks to his motor truck. It was the son coming home from delivering his milk that called forth the story from the recesses of this gentlewoman's memories.

"Just think," she said, as she sat on the sunny piazza with her knitting. "It's only 11 o'clock in the morning and John is already home from delivering his milk. He started away this morning at 4:30 with 106 cans of milk and cream. Now he's back.

"The truck certainly saves a lot of time for the farmer today. I remember back 25 years ago

when my husband used to leave the house at 1 o'clock in the morning with a pair of horses, work steadily until 12 or 1 o'clock and then drive back here, arriving about two in the afternoon, dead tired and fit only to go to bed. He'd take a nap for two or three hours and then he'd have to get up and see to the milking.

"That wasn't the worst of it either. The milk route took up so much of his time that he always had at least two hired men around the place, and the farm labor problem was just as apparent then as today. He couldn't be home to watch whether they worked or not and the result usually was that they spent more time loafing than working. Then, too, we always had to keep at least two pair of horses for the milk route alone, besides the other stock, and sometimes it was pretty hard sledding to make both ends meet."

She paused reminiscently, thinking, probably of the years of toil. Then she took up the thread of her talk. "Think of the contrast now. John delivers at least 200 quarts more milk than his father ever did, he gets his night's rest, has no bother with horses, gets along fine with one hired man and has the best part of the day at home to work with the man and see that he earns his money. I wish his father could have had his opportunities," she said with a sigh that hid a tear.

"I guess there's no doubt of the efficiency end of the comparison," I said. "It's all in favor of the truck, but how about the cost? That enters into it of course," I said, thinking to draw her out further.

"No, it doesn't enter into it at all," she corrected. "Time is what counts on a farm. Anyway, looking at the matter from a dollar-and-cents basis, the truck costs about half what the horses do. The farm books prove it. Actually the last 12 months show just about that ratio of

proportion—counting depreciation, up-keep and everything; this without taking into consideration the saving of the extra man's wages either. There's also another factor. If my son gets a chance to sell a load of produce, potatoes, hay or anything like that, he can load up his truck after dinner, go to the city, unload, and be home by 4 o'clock. That's still another advantage. His father couldn't have done that with horses.

"No, sir," emphatically, "there's only one way a horse beats a truck."

"How is that?" I asked, wondering what her answer would be.

She laughed. "You can't go horse back riding on a truck—and you can with a horse. That's about the only thing a horse is good for nowadays."

This story is written from an actual conversation and the facts as stated can be proven. Let's see the horse-boosters match it with actual facts that will prove their side of the case. Such rebuttal would be interesting, were such data available, but they aren't and anyone who has followed the trend of events knows why.

Wouldn't it be a good plan for you as a manufacturer, dealer or salesman, to go after this new farm business right now? The billion dollars appropriated for farm loans is an invitation. In the text of the act the money is to be spent "for any purposes connected with the growing, harvesting, preparation for market and marketing of agricultural products, or the breeding, raising, fattening and marketing of live stock."

That means truck sales to the hustler who has the courage to so interpret it.

PROVING IT.

HE WHO has interested himself in the transportation problem, as applied to both freight and passengers, to the extent of airing his opinions on the subject must concede, if he be fair-minded, that the motor truck has demonstrated far greater economic efficiency than any other form of transportation.

Here's the proof. Steam and trolley rates are both at the peak. Motor trucks, gasoline, oil and tires have lowered to the point where they compare very favorably with pre-war prices. That in itself should prove an argument settler. If that isn't enough, remember that the proportionate increase in the price of these items was never anywhere near as much as was the rise in rail

rates. Add to this the generally-admitted fact that automotive values are far greater today than they have been at any time during the last few years—that machines have increased in efficiency even to the extent that the price has lowered and the case would appear to be cinched.

Therefore, when you hear a self-appointed arbiter of the transportation question whose views are prejudicial to the motor truck, you may know that he has not carefully analyzed his subject. Either that, or he is a propagandist. You have our permission to "tell him where he gets off." Don't let the opportunity slip.

SAFETY AT CROSSINGS.

IN THE interest of greater safety at road crossings, T. R. Brennan, safety agent of the Long Island railroad, advocates the enactment by the New York State Legislature of a law similar to that existing in Indiana, which makes it compulsory for drivers of all kinds of vehicles to make a complete stop at every railroad grade crossing before going over it.

"In the absence of such a humane and constructive statute on our books," says Mr. Brennan, "and no such legislation even under contemplation, we must keep on appealing to drivers of automobiles to stop inviting danger at crossings."

He urges the careful observance of the following rules:

"First: Remember the railroad's slogan, 'Every time is train time at grade crossings,' and, therefore, never venture over a crossing until you have halted your machine and looked along the tracks in both directions, making doubly sure no train is approaching before you cross.

"Second: If you own an automobile, but do not drive it, insist upon your chauffeur taking the same safety measures above outlined. If he violates this important rule, discharge him summarily, rather than take the risk of being hit by a fast train at some other crossing as the result of his indifference and negligence.

"Third: If riding in a public bus or taxicab insist that the driver stop at every grade crossing, so as to insure your safety as a passenger."

The unbiased reader should put aside all thought of any inconvenience that the enforcement of such laws would cause. He owes it to himself and to the industry. Certainly no one can deny that these rulings would prove effectual in lowering the appalling death rate.

Calendar of Conventions and Exhibitions

Dec. 6-8—Chicago, Ill., Second Annual Meeting, American Petroleum Institute, Congress Hotel.

Dec. 6-9—Sioux Falls, S. D., Annual Convention, South Dakota Implement Dealers' Association; Exhibition of Farm Machinery Held in Connection.

Dec. 13-15—Peoria, Ill., Convention, Illinois Implement & Vehicle Dealers' Association; Secretary, W. L. Derry, Vermont, Ill.

Dec. 13-16—Columbus, O., Fifth Annual Convention and Exhibit, Ohio Automotive Trade Association, Memorial Hall.

Dec. 22—Philadelphia, Pa., Sectional Meeting, Society of Automotive Engineers.

Dec. 23—Detroit, Mich., Meeting, Society of Automotive Engineers.

Dec. 27-29—Chicago, Ill., Convention, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 4-6—Omaha, Neb., Convention and Exhibition, Mid-West Implement Dealers' Association; Secretary, James Wallace, Council Bluffs, Ia.

Jan. 7-13—New York City, National Automobile Show, National Automobile Chamber of Commerce, Madison Square Garden.

Jan. 9-14—New York City, First National Automobile Body Builders' Show, Automobile Body Builders' Association, 12th Regiment Armory; Passenger and Commercial Bodies, Materials and Parts.

Jan. 9-20—New York City, First Annual Retail Dealers' Auto Equipment Show, Hotel Imperial, National Retail Merchants' & Buyers' Association; Accessories and Automobile Clothing; George T. Keen, Secretary, Hotel Imperial.

Jan. 10-12—Minneapolis, Minn., Convention, Minnesota Implement Dealers' Association; Secretary, C. I. Buxton, Owatonna, Minn.

Jan. 11-14—New York City, Annual Meeting, Society of Automotive Engineers.

Jan. 12-22—Oakland, Cal., Motor Car Show, Alameda County Automobile Trade Association, Auditorium; Manager, Robert W. Martland.

Jan. 13—Newton, Mass., New England Sectional Meeting, Society of Automotive Engineers, Plant of Stanley Automobile Co.

Jan. 14-20—Cleveland, O., Automobile Show, Cleveland Automobile Manufacturers' & Dealers' Association.

Jan. 14-20—Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Association.

Jan. 17-19—Kansas City, Mo., Convention, Western Retail Implement, Vehicle & Hardware Association; Headquarters, Coates House; Sessions in Century Theater; H. J. Hedge, Secretary, Abilene, Kan.

Jan. 17-20—Spokane, Wash., Convention, Pacific Northwest Hardware & Implement Association, Davenport Hotel; E. E. Lucas, Secretary, Hutton Building, Spokane.

Jan. 17-20—Chicago, Ill., Convention, American Road Builders' Association.

Jan. 19-25—Milwaukee, Wis., Annual Automobile Show, Milwaukee Automotive Dealers' Association, Auditorium; Passenger Cars, Trucks and Accessories; Bart J. Ruddle, Manager, 316 Brumler Building.

Jan. 21-28—Cleveland, O., Show, Cleveland Automobile Manufacturers & Dealers' Association, City Exposition Building; Manager, Fred H. Caley.

Jan. 23—Milwaukee, Wis., Annual Meeting, Wisconsin Automotive Dealers' Association.

Jan. 23—Montgomery, Ala., Annual Meeting, Alabama Automobile Dealers' Association; James B. Farley, Secretary, Montgomery.

Jan. 23-26—Portland, Ore., Annual Automobile Show.

Jan. 24—Detroit, Mich., Sectional Meeting Society of Automotive Engineers.

Jan. 24-26—St. Louis, Mo., Convention, Mississippi Valley Implement & Hardware Association; Secretary, F. E. Goodwin, Kirkwood, Mo.

Jan. 24-26—Dallas, Tex., Convention, Texas Hardware & Implement Association; Secretary, A. M. Cox, Dallas.

Jan. 24-26—Denver, Col., Convention, Mountain States Hardware & Implement Association; Secretary, W. W. McAllister.

Jan. 24-27—Louisville, Ky., Convention and Exhibition, Kentucky Hardware & Implement Dealers' Association; Secretary, J. M. Stone, Sturgis, Ky.

Jan. 24-27—Portland, Ore., Convention, Oregon Retail Hardware & Implement Dealers' Association, Imperial Hotel; E. E. Lucas, Secretary, Hutton Building, Spokane, Wash.

Jan. 25-27—Fargo, N. D., Convention and Exhibition, North Dakota Implement Dealers' Association; Secretary, R. A. Lathrop, Hope, N. D.

Jan. 28—Worcester, Mass., Passenger Car Show, Worcester Automotive Association, Casino.

Jan. 28-Feb. 3—Chicago, Ill., Automobile Salon.

Jan. 28-Feb. 3—Chicago, Ill., National Automobile Show, National Automobile Chamber of Commerce, Coliseum.

Jan. 30-31—Chicago, Ill., Fifth Annual Convention, National Automobile Dealers' Association, La Salle Hotel.

Jan. 30-Feb. 4—London, Ontario, National Motor Show of Western Ontario, Ontario Automotive Retailers' Association.

Jan. 30-Feb. 4—Scranton, Pa., 12th Annual Passenger Car Show, Scranton Motor Trades Association, Armory; Passenger Cars, Trucks, Tractors and Accessories. Hugh B. Andrews, Manager, 411 Board of Trade Building.

Jan. 31-Feb. 2—Chicago, Ill., Annual Meeting, Automotive Electric Service Association, La Salle Hotel.

Jan. 31-Feb. 2—Lincoln, Neb., Convention, Nebraska Retail Hardware Association; George H. Dietz, Secretary, 411-417 Little Building, Lincoln.

Feb. 3-10—Minneapolis, Minn., 15th Annual Automobile Show, Minneapolis Auto Trade Association; Passenger Cars, Trucks and Accessories; W. R. Wilmot, Manager, 709 Andrus Building, Minneapolis.

Feb. 6-9—Scranton, Pa., Annual Truck Show, Scranton Motor Trades Association, Armory; Hugh B. Andrews, Manager, 411 Board of Trade Building.

Feb. 6-11—Winnipeg, Manitoba, Canada, Second Annual Automotive Equipment Association, Board of Trade Auditorium. Secretary, W. L. Williams, New Stovel Building, Winnipeg.

Feb. 6-11—Minneapolis, Minn., Seventh Annual National Tractor Show and Educational Exposition, National Implement & Vehicle Association, Minneapolis State Fair Grounds.

Feb. 7-10—Oklahoma City, Okla., Convention and Exhibition, Oklahoma Implement & Hardware Association; Secretary, W. B. Porch, Oklahoma City.

Feb. 7-10—Grand Rapids, Mich., Convention and Exhibition, Michigan Retail Hardware Association; Karl S. Judson, Exhibits Manager, 248 Morris Avenue, Grand Rapids; A. J. Scott, Secretary, Marine City, Mich.

Feb. 8-10—Milwaukee, Wis., Convention and Exhibition, Wisconsin Retail Hardware Association; P. J. Jacobs, Secretary, Stevens Point, Wis.

Feb. 9-16—Kansas City, Mo., Kansas City Motor Car Dealers' Association.

Feb. 11-18—San Francisco, Cal., Sixth Pacific Automobile Show, Motor Car Dealers' Association of San Francisco, Exposition Auditorium; Passenger Cars, Trucks, Tractors and Accessories; G. A. Wahlgreen, Manager, 215 Humboldt Bank Building.

Feb. 12—Madison, Wis., Ninth Annual Show, Automobile Dealer Division, Association of Commerce; Passenger Cars, Trucks and Accessories; Don W. Mowry, Manager, Cartwell Building.

Feb. 14-16—Chicago, Ill., Convention, Illinois Retail Hardware Association, Hotel

Sherman; Leon D. Nish, Secretary, Elgin, Ill.

Feb. 14-17—Philadelphia, Pa., 21st Annual Exhibit and Convention, Pennsylvania & Atlantic Seaboard Hardware Association, Inc., Commercial Museum; Automobile Accessories, Etc.; Sharon E. Jones, Secretary, 1314 Fulton Building, Pittsburgh.

Feb. 14-17—St. Paul, Minn., Convention, Minnesota Retail Hardware Association; H. O. Roberts, Secretary, 1030 Metropolitan Life Building, Minneapolis.

Feb. 18-25—Albany, N. Y., Automobile Show, Automobile Dealers' Association, State Armory.

Feb. 20-25—Syracuse, N. Y., Passenger Car Show, Automobile Dealers' Association, State Armory.

Feb. 20-25—Deadwood, S. D., 10th Annual Black Hills Auto Show, Deadwood Business Men's Club, Auditorium; Passenger Cars, Trucks, Tractors and Accessories.

Feb. 20-25—Duluth, Minn., Seventh Annual Show, Duluth Auto Trade Association, Duluth Armory Building; Passenger Cars, Trucks, Tractors and Accessories.

Feb. 20-25—Louisville, Ky., 14th Annual Automobile Show, Jefferson County Armory; Passenger Cars and Accessories; George T. Holmes, Inter-Southern Building.

Feb. 21-24—Mitchell, S. D., Convention and Exhibit, South Dakota Retail Hardware Association; H. O. Roberts, Secretary, 1030 Metropolitan Life Building, Minneapolis, Minn.

Feb. 23—Philadelphia, Pa., Sectional Meeting Society of Automotive Engineers.

Feb. 21-24—Des Moines, Ia., Convention and Exhibition, Iowa Retail Hardware Association; Exhibition in Coliseum; A. R. Sale, Secretary, Mason City, Ia.

Feb. 24—Detroit, Mich., Meeting Society of Automotive Engineers.

Feb. 26-March 3—Des Moines, Ia., Winter Automobile Show.

Feb. 27-March 2—Bethlehem, Pa., Seventh Annual Truck Show, Bethlehem Auto Trade Association, Coliseum; Trucks, Tractors and Accessories; Manager, J. L. Elliot, 1308 Norway Place.

Feb. 27-March 4—Springfield, Mass., Seventh Annual Automobile Show, Springfield Automotive Dealers' Association.

Feb. 27-March 4—Atlanta, Ga., Second Annual Great Southern Automobile Show, Atlanta Automobile Association, Auditorium Armory; Passenger Cars, Trucks and Accessories; Virgil W. Shepard, Manager, 305 Connolly Building.

Feb. 27-March 10—London and Birmingham, England, British Industries Fair.

Feb. 28-March 4—Wichita, Kan., Accessory Show, Wichita Motor Trade Association, Exposition Building.

March (first week)—Lewistown, Mont., Convention, Montana Implement Dealers' Association; Secretary, J. E. Owens, Lewistown.

March 4-11—Brooklyn, N. Y., 11th Annual Show, Brooklyn Motor Vehicle Dealers' Association.

March 7—Dayton, O., Sectional Meeting, Society of Automotive Engineers; Speaker, Captain Lorenzo L. Snow.

March 11-18—Newark, N. J., Automobile Show, Newark Automobile Dealers' Association.

March 11-18—Boston Show, Mechanics' Building.

March 23—Philadelphia, Pa., Sectional Meeting, Society of Automotive Engineers.

March 24—Detroit, Mich., Meeting, Society of Automotive Engineers.

April 27—Philadelphia, Pa., Sectional Meeting Society of Automotive Engineers.

April 28—Detroit, Mich., Meeting, Society of Automotive Engineers.

May—Trenton, N. J., Annual Convention, New Jersey Automotive Trade Association; Secretary-Treasurer, H. S. Moore, Trenton.

May 16-19—Chattanooga, Tenn., Convention and Exhibition, Southeastern Hardware and Implement Association (Alabama, Florida, Georgia, Tennessee); Secretary, Walter Harlan, Jacksonville, Fla.

Decided Improvement Shown in Foreign Trade

October Exports of Trucks Increase 26 Per Cent. in Numbers and 57 Per Cent. in Value—Passenger Car Shipments Also Are Augmented—Other Automotives Show Decrease

A DECIDED improvement is noticeable in the exports of passenger cars and motor trucks during the month of October, as compared with the previous month. The increase in passenger cars exported amounted to six per cent. in number and four per cent. in value; in motor trucks, 26 per cent. in number and 57 per cent. in value. Exports of motorcycles, on the other hand, declined in value almost one-fourth; those of air planes nearly three-fourths. The value of total automotive exports, including air planes and motorcycles, increased eight per cent. in October as compared with September, and decreased 79 per cent. as compared with October, 1920, according to a government compiled report.

EXPORTS of complete cars were, as regards value, eight per cent. greater in October than in September; in chassis alone were 13 per cent. smaller. The total exports of passenger cars for October were made up, as to number, of 77 per cent. complete cars and 23 per cent. chassis; as to value, 83 per cent. were complete cars and 17 per cent. were chassis. A comparison with October, 1920, shows a decrease of 80 per cent. in number of passenger cars exported and 87 per cent. drop in value. The unit value of passenger cars exported during October, 1921, decreased \$433, or more than one-third of the unit value of a year ago. There was also a decrease of \$14 as compared with September, 1921.

Motor Truck Exports Increase.

Exports of motor trucks made a far better showing than those of passenger cars. Exports of both complete cars and chassis increased not only in number, but also in value. This increase for complete cars in October, 1921, compared with September, 1921, amounted to six per cent. in number and three per cent. in value; for chassis, the increase was 46 per cent. in number and 110 per cent. in value. It is noticeable that the increase in chassis exported greatly exceeds that of complete cars exported; this may be the result of high duties imposed in many countries upon the importation of bodies and the relative cheapness of manufacturing truck bodies, as compared with

the high cost of duty and freight on their importation. In September, 1921, the number of motor trucks exported was evenly divided between complete cars and chassis; in October complete cars made up 43 per cent. and chassis 57 per cent. An increase of \$249 is noticeable in the unit value of trucks in October, 1921, over that of the previous month and a decrease of \$384 as compared with October, 1920.

Motorcycle Exports Decrease.

Exports of motorcycles, after having given cause for great expectations in September, fell off in October—the decrease amounting to 29 per cent. in number and 24 per cent. in value. A comparison of October, 1921, with the same month of the previous year, gives evidence of the general slump which has not spared exports of motorcycles. This decrease amounts to 86 per cent. in number and 88 per cent. in value. The unit value of motorcycles in October, 1921, increased \$19 as compared with the previous month, and decreased \$47 as compared with October, 1920.

Air Plane Exports Decrease.

In spite of the fact that the commercial value of air planes as a means of communication is realized more and more and that air service all over the world is

STATISTICS OF AUTOMOTIVE EXPORTS, OCTOBER, 1921.

DETAILED figures of automotive exports from the United States for September and October, 1921, are given in the following tables:

Automotive Exports, October 1920 and 1921.

		October, 1920.			October, 1921.			Per Cent. of Increase (+) or decrease (—).	
		Number	Value	Unit Value	Number	Value	Unit Value	Number	Value
Motor Vehicles									
Passenger cars	11,562	\$14,699,402	\$1,271	2,329	\$1,952,641	\$838	—80	—87	
Complete cars	10,595	13,586,255	....	1,791	1,621,474	....	....	....	....
Chassis	967	1,113,147	....	538	331,170	....	....	....	....
Motor trucks	2,435	4,025,161	1,653	595	755,096	1,269	—75	—81	
Complete cars	1,551	2,358,053	....	254	244,669	....	....	....	....
Chassis	884	1,667,108	....	341	510,427	....	....	....	....
Parts of cars and trucks	....	6,910,538	....	....	2,702,002	....	....	—61	
Motorcycles	3,161	969,793	307	444	115,271	260	—86	—88	
Air planes	10	147,600	14,760	1	8,000	8,000	—90	—95	
Air plane parts	....	6,811	....	....	4,421	....	....	....	....
Total	....	\$26,759,305	....	....	5,537,431	....	....	—79	

Automotive Exports, September and October, 1921.

							Per Cent.	
							of Increase (+)	
							or decrease (—).	
October, 1921.				September, 1921				
Motor Vehicles	Number	Value	Unit Value	Number	Value	Unit Value	Number	Value
Passenger cars	2,329	\$1,952,641	\$838	2,197	\$1,870,770	\$852	+06	+04
Complete cars	1,791	1,621,471	....	1,631	1,493,019	....	....	....
Chassis	538	331,170	....	566	377,751	....	....	....
Motor trucks	595	755,096	1,269	472	481,664	1,020	+26	+57
Complete cars	254	244,669	....	239	238,610	....	....	....
Chassis	341	510,427	....	233	243,054	....	....	....
Parts of cars and trucks.		2,702,002	....	....	2,570,860	....	....	+5
Motorcycles	444	115,271	260	627	151,380	241	—29	—24
Air planes	1	8,000	8,000	8	31,000	3,875	—88	—74
Air plane parts		4,421	....	....	3,956	....	....	....
Total		\$5,537,431	....	....	5,109,630	....	....	+08

constantly expanding, exports of air planes manufactured in the United States fell off considerably during October. A comparison of air plane shipments, excluding parts, for October, 1921, with those of September, shows a decrease of 88 per cent. in number and 74 per cent. in value; a comparison of the October, 1921, figures with those for October, 1920, gives evidence of a still greater decrease—90 per cent. in number and 95 per cent. in value.

Markets for Passenger Cars.

The four important markets for passenger cars, listed in the order of number of cars imported from the United States, are: Mexico, Australia, Canada and the United Kingdom. These are followed by the Far Eastern markets—Japan, British South Africa and British India, respectively. Shipments in October to the four countries first named amounted to 58 per cent. in number, as compared with the total shipment for the month, and 53 per cent. in value; 27 per cent. of the total went to Mexico; 12 per cent. to Australia; 10 per cent. to Canada and nine per cent. to the United Kingdom.

Shipments to Mexico also led during the month of September, by number and value, and are followed by Canada, Australia and Japan. A considerable decrease of shipments to Japan took place in October, as compared with September. The picture during October, 1920, was an altogether different one. The list was headed by the United Kingdom, followed by British India; Mexico and Canada rank very low. The unit value of shipments differed widely, with Canada offering at present the best market for high-priced passenger cars, and Mexico the best for low-priced cars.

Markets for Motor Trucks.

The markets for motor trucks, according to October shipments, can be divided into four groups: (a) Mexico, Brazil and Canada; (b) Netherlands and the United Kingdom; (c) Japan and British Oceania; (d) all other countries. The grouping is the same for number and value of exports. The percentage of shipments to group (a) is 54 per cent. in

number and 61 per cent. in value; to group (b) 19 per cent. in number and 15 per cent. in value; to group (c) 13 per cent. in number and eight per cent. in

RECIPROCATATION.

THE idea that America can attain to any great degree of trade wealth without her foreign markets is wholly erroneous; so silly as to approach puerility. This country is neither self-contained nor self-containing. For instance, in the matter of food stuffs alone we are actually dependent on imports to the sum of \$2,000,000 a day, and use a lot more than that. In exactly the same way foreign countries are dependent on our exports to a far greater amount than this. The United States has a paltry five per cent. of the population of the world, and yet in the value of products ranks first of all nations, having 24 per cent. of all food, 50 per cent. of the gold, 40 per cent. of all minerals, and nearly 40 per cent. of all manufactured goods in the entire world. Someone must use this surplus of agrarian, mineral and fabricated wealth, and he who is thoroughly posted on international commerce knows who that some one must be if we are to continue to prosper. Perhaps you don't realize this. Wait until the present business conference at Washington straightens out the gold situation and see what happens. Business will "pick up" all right. See if it doesn't.

value; to group (d) 14 per cent. in number and 16 per cent. in value. According to the number of trucks exported, Mexico heads the list; it is only third, however, as regards value of shipments. Exports to Brazil are first in value. The best market for low-priced trucks, considering both number and unit value, is Mexico (the exceptionally low figure can be explained only by the heavy importation of low-priced chassis and second-hand army trucks). By far the best market for high priced trucks is Brazil.

A comparison of October shipments with those of the month of September shows that Japan has fallen behind; whereas it headed the list as to number in October, in September it ranked sixth. Canada and Mexico held their own in both months. The United Kingdom, which headed the list in number of trucks taken in October, 1920, dropped to fourth place in September, 1921, and to fifth in October, Peru and Cuba, which occupied second and third place in number of shipments during October, 1920, fell far behind; the Netherlands, on the other hand, counted little during 1920, but developed into an important market during the fall of 1921.

Automotive Share in United States Exports, January to October, 1921.

A comparison of the total exports from the United States with the automotive exports (excluding motorcycles and air planes) by monthly totals for 1921 compared with those for 1920 gives evidence of the following development:

While in January, 1921, the total exports decreased nine per cent. from those of January, 1920, the exports of automotive products increased 17 per cent—probably due to contracts for automotive products concluded in the previous year but not fulfilled immediately. This policy of making shipments previously contracted for at a time when the general trade depression was already under way has saved the American exporter from considerable financial losses, but at the same time it has caused, justly or unjustly, a great loss of good will abroad. The total exports reached their lowest point of de-

(Continued on Page 667.)

Sprague Electric Dynamometer

Designed for General Factory Testing of Engines, Units
and Complete Vehicles—Operation of Equipments
Can Be Learned in Short Time

SPRAGUE electric dynamometers, manufactured by the Sprague Electric Works of the General Electric Co., with main offices at 527-531 West 34th street, New York City, are designed for the general factory testing engines, complete vehicle and other units which enter into the construction of power vehicles. The function of the electric dynamometer is to measure torque. The engine in test is coupled to the internally revolving rotor of the dynamometer, which transmits the full torque extorted by the engine to the external field or oscillating frame by electro-magnetic inter-action. The oscillating frame is balanced on ball-bearing pedestals and is restrained from revolving by the scales on which the torque is measured.

IN MEASURING horsepower the product of speed and torque are taken into consideration. Specifically, for a dynamometer,

$$H. P. = \frac{R. P. M. \times \text{Lbs. Pull} \times \text{Torque}}{5250}$$

By making the torque arm in feet or distance between the point of application of the scales and the center of the shaft a certain length, the horsepower formula is simplified. For the Sprague electric dynamometer the formulas are:

$$H. P. = \frac{\text{Lbs. Pull on Scales} \times R. P. M.}{1000}$$

with some scale arrangements and, with others,

$$H. P. = \frac{\text{Lbs. Pull on Scales} \times R. P. M.}{3000}$$

These simple formulas can be worked out, or a straight-line power chart used. **Dynamometer Fields Excited Separately.**

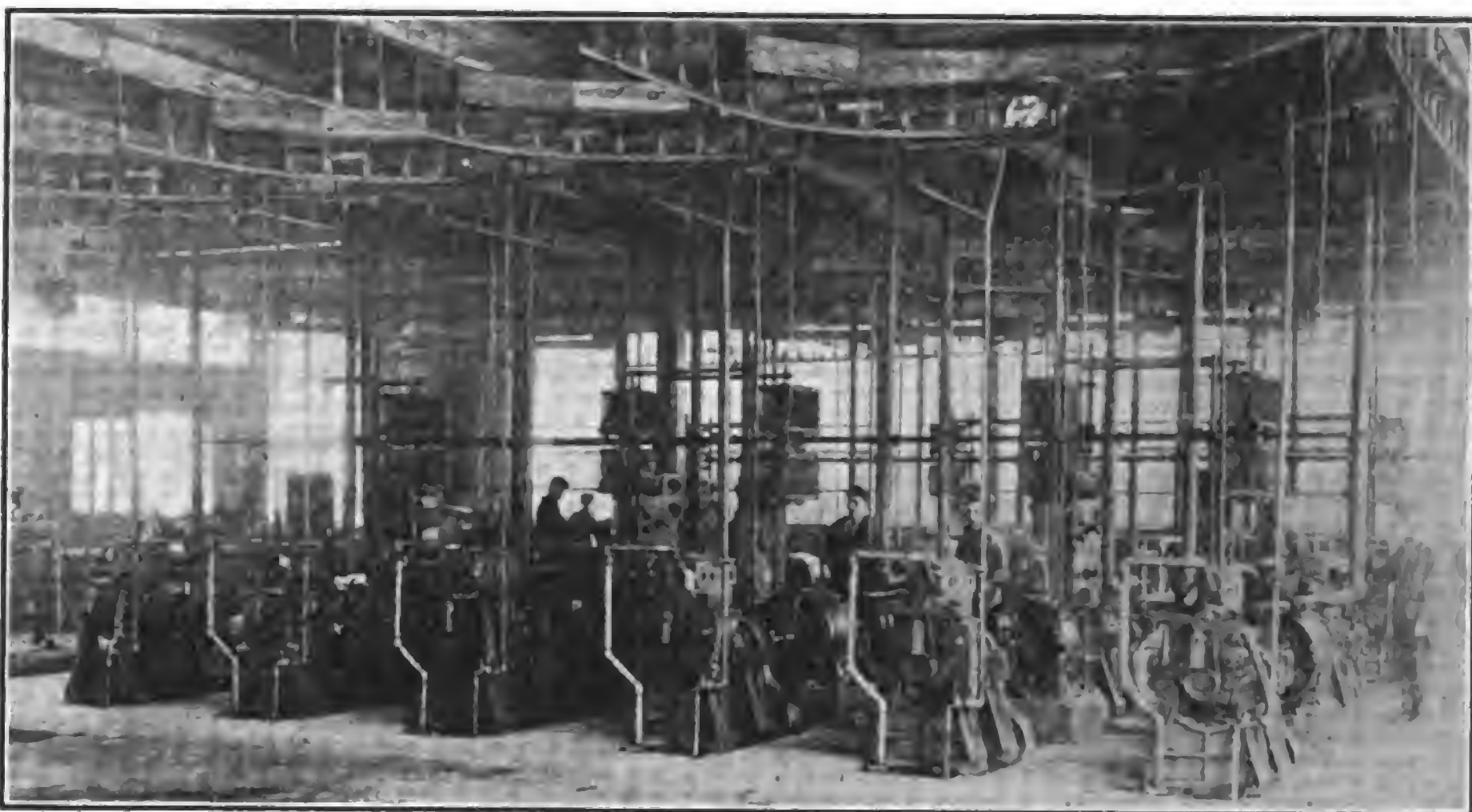
The electric dynamometer requires a source of separate excitation for the fields at either 115 or 230 volts, direct current. In special cases the dynamometer may be made self-exciting, but its speed range under these conditions is limited and, except for production tests, separate excitation is essential. The power required for separate excitation of the fields is extremely small. A larger source of supply is necessary, however, when the dynamometer is to be used as a motor.

Operating as a Motor.

A very important feature of the Sprague dynamometer is its ability to operate as a transmission dynamometer or motor for starting the engines on test, and also for measuring the friction horsepower and determining the mechanical efficiency. For such operations the requirement is an adequate supply of direct current at either 115 or 230 volts. For friction horsepower tests the supply of direct current available should be at least 25 per cent. of the maximum capacity of the engine to be tested.

Wide Control Range.

The control of load and speed through a very wide range is possible with this machine, it is claimed, and is one of the most distinguishing features of the Sprague electrical dynamometer.



A Very Important Feature of the Sprague Dynamometer Is Its Ability to Operate as a Transmission Motor for Starting the Engines on Test.

Fittings for laboratory testing include automatic control, rheostats having a wide capacity, capable of variation in load and speed through a range as great as can be carried by any engine within the maximum capacity of the dynamometer. Operated as a generator or brake the speed can be controlled, it is stated, from practically a stand still up to a maximum of 2500 to 4500 revolutions a minute, depending upon the particular dynamometer in use, through a very great range of speed and by such fine and gradual increments that any desired speed can be obtained. If backed up with direct current power of sufficient capacity, the speed range as a motor or transmission dynamometer is nearly as great.

Laid Out for Full Torque.

Throughout the speed range the dynamometer can be made to resist or brake to its full rated torque capacity. In practical service the equipment is laid out for full torque capacity through an intermediate range, but by special provision in the resistor design, full torque capacity can be maintained from zero to maximum speed, with shorttime over-load torque capacity up to the limit of the dynamometer.

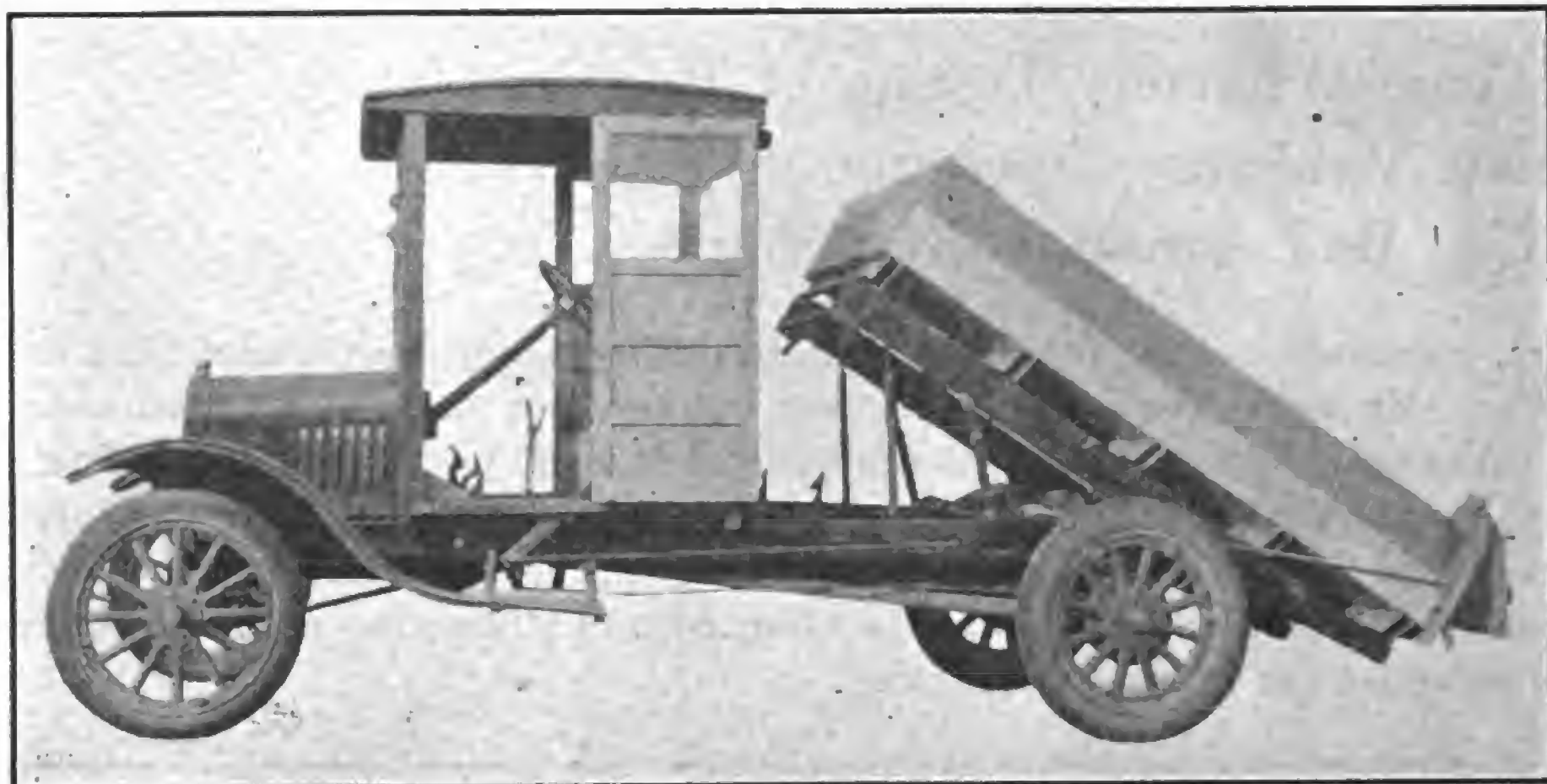
This great flexibility of control enables the tester to study the performance of engines beyond their limits of load and

speed, making possible with one dynamometer to conduct tests on a wide variety of engines, both large and small, high and low-speed.

The control panel is also fitted with a magnetic switch controlled by push buttons for starting the dynamometer as a motor. An automatic overload circuit breaker is provided as a protection for the dynamometer and engine in case of overload. This is fitted with an auxiliary switch, cutting off the ignition circuit when the circuit breaker opens. By an ingenious arrangement of circuits a single-dial switch lever is used for regulating the speed when the dynamometer is being used as a motor for starting and for making tests of friction horsepower, and for the major changes of load adjustment when running as a generator or brake.

A double-field rheostat controls the finer load adjustments, the rheostat being fitted with two concentric handles, conveniently placed in the center of the board. This rheostat in laboratory work provides several thousand possible load and speed adjustments. The control is so arranged that the operation of the equipment can be mastered in a few minutes by a man unskilled in electrical matters. Provision is made also against accident to either operator or engine in the case of improper operation.

Standard Steel Dump Body Used With Ford



Truck Equipped with Standard Steel Dump Body Which Is Especially Designed for Road Construction.

STANDARD STEEL WORKS, 1722-1730 Tracy avenue, Kansas City, Mo., manufactures a steel body designed to be used with the Ford one-ton

truck, which is fitted with a dumping device, is simple in construction, easy of operation and embodies several unique features.

This special type of body is adapted for road construction work, where the contractor handles small jobs. It is fitted with a partition through the center dividing the load into the correct weights for the mixer. This feature is especially desirable when aggregate is handled or when the batch is hauled in a dry state before mixing with water, as many of the batch mixers only handle one-half of a cubic yard of material at a time. The capacity of the body is one cubic yard, which is claimed to be a sufficient load for the Ford ton-truck chassis.

Although the Standard steel dumping body and dumping device has only been on the market for a few months, during this time a number have been sold as far East as New York state; also a large number of orders have been taken in Texas. The company anticipates a large demand for this equipment in other sections of the country and has made special plans for marketing the product. The Ford truck is rapidly gaining favor among road contractors, it is said.

Power Operated Winch for Motor Truck

A MOTOR truck of heavy capacity, equipped with power winch back of the driver's seat, operated by chain and sprockets from the propeller shaft or from the power take-off of the transmission, offers a wide field of usefulness. In moving heavy machinery, steel safes and heavy building material, the power-operated winch is capable of performing the work with a rapidity and safety that is all the more remarkable when one considers the short time that this highly important piece of apparatus has been in the process of development. The old saying that "Necessity is the Mother of Invention," is well borne out by the fact that the winch was not properly developed until necessity arose for its use. A bright genius conceived the idea that the motor truck engine could

be used to advantage in lifting and lowering heavy materials and, from the ideas gained from hoisting engines, the small units now in use for this purpose have been developed.

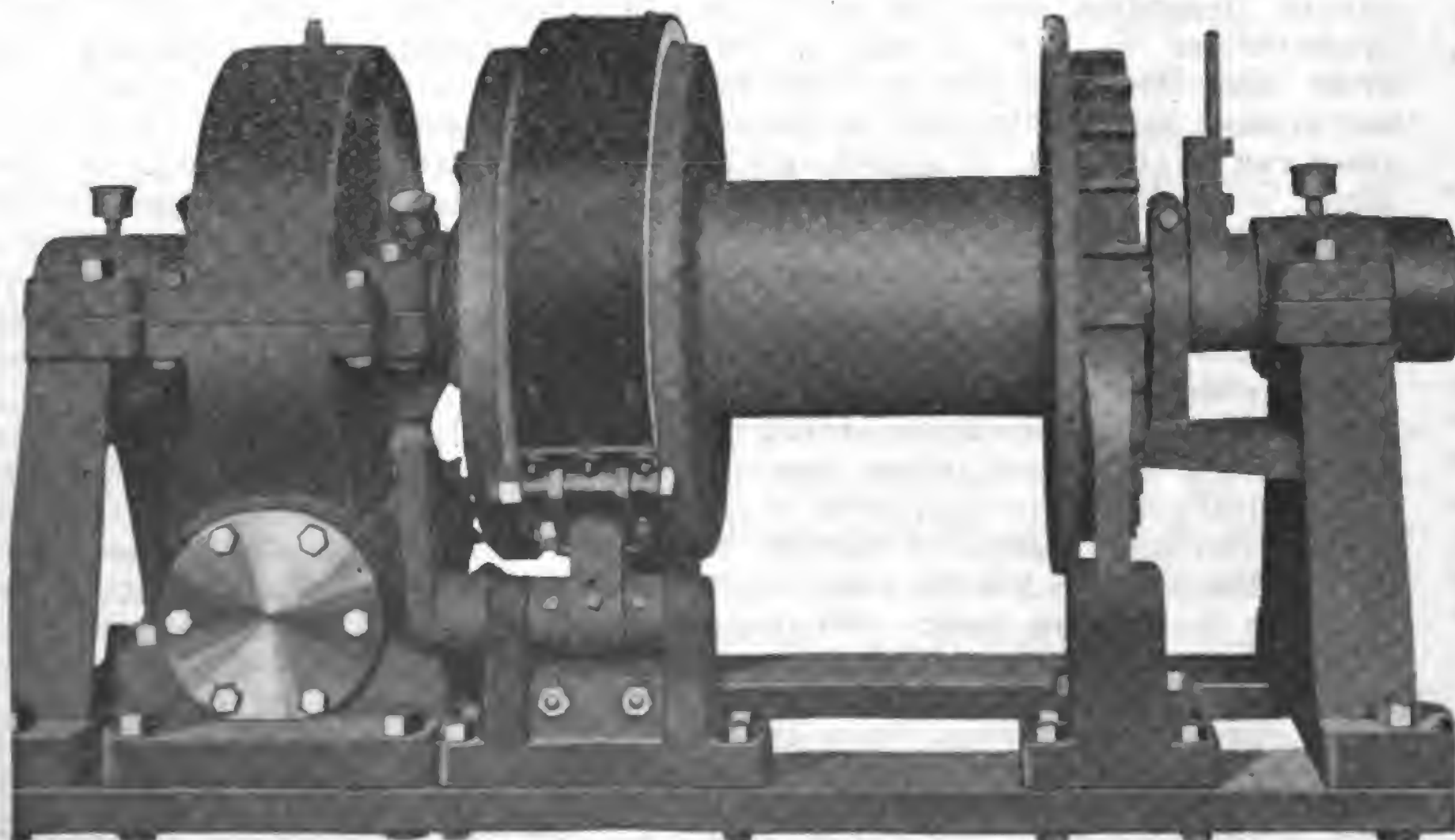
Winches in various styles are now available for different purposes, all operated by the power of the motor truck engine, and without a great amount of effort they are easily fitted to practically any existing truck frame without adding materially to the frame members.

Erie Hoist, Model 227-E.

The Erie Hoist Co., Erie, Pa., manufactures a very complete line of hoists of the power-operated type, which are easily applied to motor trucks in the rear of the driver's seat. The units are built completely assembled and may be installed on the truck frame in a few hours'



End View of Erie Hoist Showing Massive Size of Trunnion Supports.



Erie Worm-Driven Hoist Proves Popular with Riggers, Movers, Lumbermen, Oil Operators and Others Who Move Heavy Units by Use of Motor Truck.

time. Connection for power is made through a chain drive and sprockets to the propeller shaft or to the power take-off of the transmission gear box, while control of the unit is in the cab of the truck convenient to the driver.

The frame on which the winch is mounted brings the drum as low as possible, while the mounting may be raised six inches higher, if desired, for special cases.

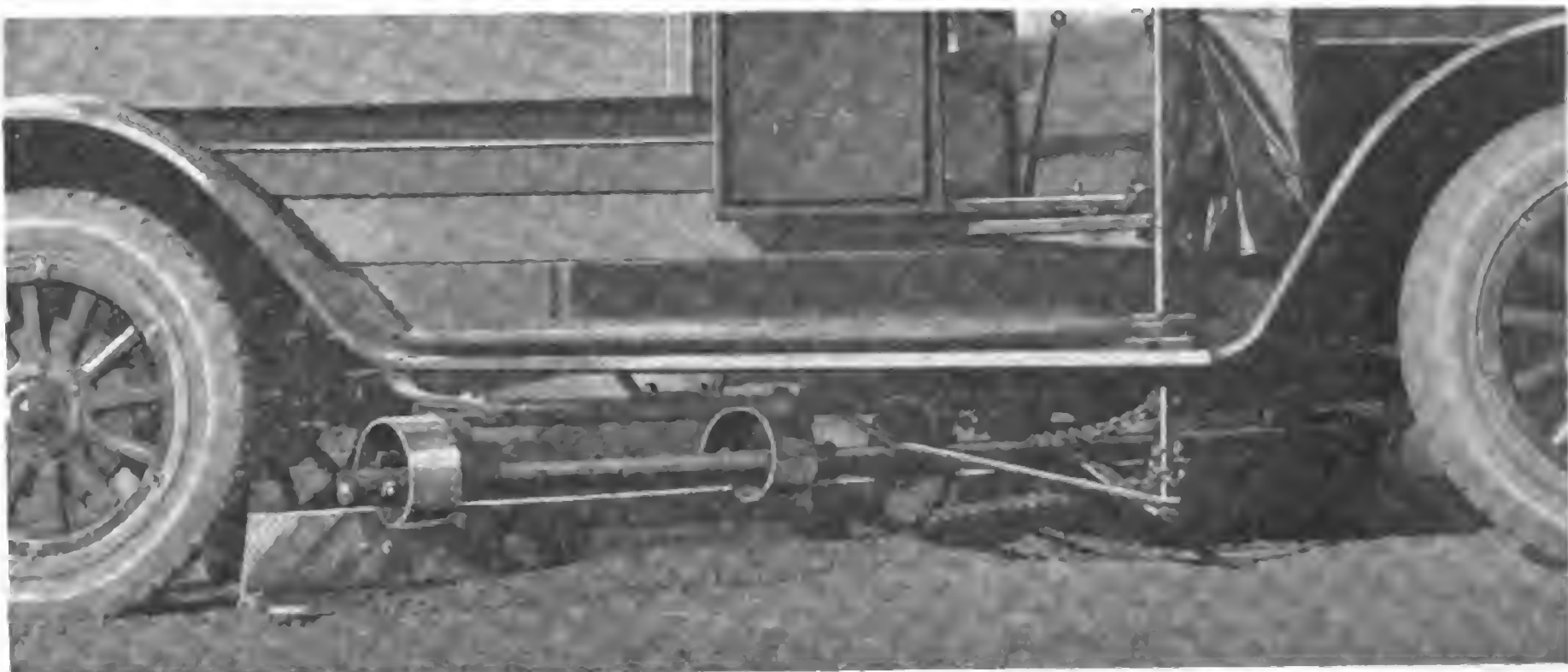
Clutch and brake levers are carried into the driver's cab, or the winch may be operated from the platform of the truck, as desired.

The drum is driven by a powerful friction clutch located on one end, the ratchet and pawl being on the opposite end to lock the load securely, a special feature of the Erie winch. "Nigger-heads" are not furnished unless ordered specially with the winch.

Root Spring Scraper Attachment for Reo

ONE of the biggest problems confronting municipalities at the present time is that of the road maintenance. Keeping roads in proper condition is very much better business than having to rebuild them frequently, in that they insure comfort and economy in transportation. The Root spring scraper has been designed for attachment to a Reo Speed Wagon and, it is stated, will replace at least six teams of horses in road maintenance work, and the company manufacturing the implement guarantees that it will do better work than any horse-drawn drag or scraper. It will handle gravel at a speed varying from 10 to 15 miles an hour. At this speed it spreads the gravel more evenly, fills up the little cups and ruts, and, it is claimed, cannot be equalled in maintaining an ordinary dirt road.

ROOT SPRING SCRAPER CO., Kalamazoo, Mich., is the patentee and manufacturer of this device which the Reo Motor Car Co., Lansing, Mich.,



Showing Method of Attaching Root Spring Scraper to Under Chassis of Reo Speed Truck—It is Claimed That Such a Combination Saves Much Expense.

has adapted for use with the Reo Speed Wagon equipped with a hoist dumping body, as shown in the illustration.

The scraper is adjustable to different pressures on the road. With a dump body the driver can start with practically a yard of gravel "floating" the road as he goes. At bad spots or holes he stops, fills them with gravel, levels it down and proceeds. Once this is done it is not necessary to carry gravel at all times, the advantage being in the fact that the road can be scraped every few days at the proper time. All dirt roads should be dragged or scraped when they are just "ripe." It is difficult to estimate the actual saving when a truck similar to this can take

care of from 15 to 35 miles of road in a day as compared with horses doing four or five miles.

By taking off six nuts the scraper can be removed and the truck used for other purposes. The company stands ready to prove its statement that this rig is able to save at least 75 per cent. of the cost of maintaining roads and that better work can be accomplished than with horses. The statement is made that one outfit can readily take care of a long stretch, going over the road daily. This method of road maintenance is figured to save tax payers from \$75 to \$225 per mile of road.

Road commissioners state that the Reo Speed Wagon is logical for this work.

An Easy Way of Figuring Truck Ton-Miles

DO YOU know how to figure the ton-mileage of your motor truck?

If not, a simple and accurate method is given by the B. F. Goodrich Rubber Co. Before arriving at the cost of truck operation it is essential to have the ton-mile figure for comparison with the average daily cost of operation. Such a system will allow the owner to compare the operating cost of one truck with another, and also truck haulage with horse and wagon delivery.

There are two classes of units used for measuring truck haulage. One is the absolute ton-mile, while the other is the commercial ton-mile. They should not be confused.

The absolute ton-mile is similar to that used in figuring railroad freight mileage. Because of the various systems of delivery, contingent on stops and loads to be dropped en route, what is called the commercial ton-mile is adopted as a standard of measurement. The absolute or railroad ton-mile is one ton carried one mile. Thus, one ton carried five miles equals five ton-miles, and five tons carried one mile also equals five ton-miles.

Absolute ton-miles should be figured in connection with motor truck haulage only when uniform hauls are made—that is, when one truck carries the same load over the same distance. By simply mul-

tiplying the number of miles covered by the number of tons carried the owner can easily determine the cost per ton-mile by

TON miles are nothing more than the units for measuring truck performance. The principle of ton-mileage may be applied to any class of motor truck haulage whether the units are baskets, bundles, kegs, cases or thousands of feet of lumber. For the concern which does not do its hauling in tons the same measure of haulage may be had by simply substituting for the ton the unit best suited to measure the delivery system. Thus instead of the ton-mile we have the package-mile, multiplying the number of packages delivered by the number of miles covered in delivering them, or the keg-mile or the case-mile.

the additional operation of dividing the average daily ton-mileage into the average daily cost of operation. The result

will be the cost per ton-mile. These figures are indispensable in keeping an accurate account of delivery expense and profit.

The commercial ton-mile is figured for trucks employed in continually making deliveries of portions of their loads. The big majority of trucks are operated under this condition.

The information from which to figure the commercial ton-mile comes from the driver's card. All that is needed is the number of deliveries made, the weight of each load and the total mileage for the day. First determine the average tons per trip. This is found by reducing the total number of pounds hauled to terms of tons, i. e., 12,000 pounds would be termed as six tons. The average tons per trip, or the average load, is found by dividing the number of tons hauled by the number of deliveries made, i. e., six (tons) divided by five (deliveries) equals 1 1/5 tons, or the average load. This result multiplied by the total mileage for the day gives the ton-miles. For example, if the mileage covered by the truck is 60, the ton-mile for the day amounts to 72, or 60 times 1 1/5.

When the truck makes but one trip a day the mileage is simply multiplied by the number of miles carried, thereby using the absolute ton-mile basis.

Withstands Hard Service

Ranger Trailer Designed to Meet Conditions Found in Lumber and Oil Regions—Adds to Motor Truck Pay Load

IT IS at present required by the traffic laws in many states that the load limits of heavy-duty trucks be five tons. That this limit is often exceeded by motor trucks may be noticed daily by anyone who takes interest in traffic. Certain truck manufacturers have seen the wisdom of devising some way to meet this condition and are getting into production with trailers designed for their trucks which are capable of carrying greater pay loads than the trucks themselves, distributing the load over six wheels instead of four as in the truck.

IT IS stated that the motor truck engine is capable of hauling fully three times the load with a trailer than is possible with the truck alone on account of the distribution of the load which, in the case of a two-ton vehicle, is acknowledged to be about 25 per cent., or 1000 pounds on the front wheels and 75 per cent., or 3000 pounds, on the rear wheels. With the trailer distributing the load over six wheels instead of four, the load is about 15 per cent., or 600 pounds on the front wheels, 45 per cent., or 1800 pounds on the driving wheels and 40 per cent., or 1600 pounds on the trailer wheels.

The fact that a two-ton truck can haul a four or five-ton load with a semi-trailer at less cost than the same load can be hauled on a four or five-ton truck creates a strong tendency to the use of lighter trucks with trailers.

The Ranger trailer, manufactured by the Southern Motor Manufacturing Association, Ltd., Houston, Tex., is designed

to meet the conditions found in that locality which demand that the units must be made unusually strong to withstand hard usage. Its production goes mostly into the hands of logging, lumber and oil companies which operate trucks under difficult road conditions, and the trailers are designed for these lines of work almost exclusively.

The Martin sleeve-bearing axle or fifth wheel is used on all models, the lengths of the bodies varying according to the tonnage carried and the work for which the trailer is wanted. The lumber trailer embodies several special features which shorten the time of unloading and also act as a time saver in delivering. A steel roller mounted at the rear is operated by a hand lever, through a cam and ratchet, starting the load at the unloading point and allowing it to roll off from the trailer body on to the ground in a neat pile. Five minutes is claimed to be the average unloading time by this method, which allows delivery by one man.

The Oil Field and Logging trailer is designed and built to withstand the hard usage of this service. It is constructed of seasoned oak, heavily bolted and braced at all points of possible strain. The 16-foot steel draw pole permits an adjustable length of from nine to 17 feet while the sliding bolster prevents shifting of the load when turning or backing, and is reinforced with steel. It is made in three and five-ton sizes.

The Semi-Trailer is designed along similar lines, but is especially adapted to fill a need for this type of vehicle in industrial and farm service, two capacities being manufactured, three and five-ton, with body lengths and widths the same; that is, 14 feet long and four feet, 10 inches wide and 40 and 48 inches high respectively. Wood artillery wheels of St. Mary's make are used as standard

equipment on all models, equipped with either solid or pneumatic tires as desired, the solids being standard, while pneumatics are furnished at additional cost. Twenty-four-inch Martin rocking fifth wheels are used on all three-ton models, while the 30-inch size is used on the five-ton models.

Schuler Front Brakes

SCHULER AXLE MANUFACTURING CO., INC., Louisville, Ky., is showing its newly designed Model 570 brake equipped front axle, which has been especially designed for motor



Additional Braking Surface Is Gained by Use of These Front Wheel Brakes.

trucks and trailers having a capacity of two to 2½ tons' capacity and, with slight variations, may also be adapted for use on passenger cars. While front wheel brakes are not new, having been employed for a number of years on European cars, they are, however, novel on American-built cars. The chief advantage gained by their use is that additional braking surface is gained and stops can be made more quickly than when dependence is placed on the rear wheel brakes only. The statement is made that a vehicle will usually stop in half the distance if four-wheel brakes are employed.

The Schuler front axle, equipped with expanding brakes, offers manufacturers of two to 2½-ton trucks an opportunity to supply their product with this new device, which is not affected, it is claimed, by the oscillating motion of the wheel spindle in turning and operates as freely as do the rear wheel brakes in conventional construction.

Description of Front Wheel Brakes.

The knuckle pin is elongated to support the brake actuating mechanism on its upper portion and the brake band at the bottom. The knuckle pin is securely keyed to the knuckle with a tapered key and turns with and serves as a pivot on which the steering knuckle rotates in

(Continued on Next Page.)



Trailers Are Considered Indispensable by Truck Operators Who Desire to Increase the Load Carried and Still Keep Within the Confines of Traffic Laws.

Patent Office "Starved" for Lack of Help

Efficiency of Department Stated to Be Impaired by Small Salaries Paid Employees—Service Falling Behind at Rate of 400 Applications a Week—281 Examiners Have Resigned.

(By the HON. THOMAS E. ROBERTSON, United States Commissioner of Patents.)

IN THE government service in Washington, there are 50 "clerks" who receive a basis salary of \$60 a month. These are typists and clerks. Of the 50, 30 of them are in the Patent office. Thirteen male employees in the Patent office doing clerical work receive only \$60 a month. There are also 92 clerks, some of whom are stenographers, some men and some women, who receive \$900 a year.

Gets Last Choice.

THE result of these low salaries is that the Patent office is offered only such clerks as the other departments cannot utilize. In other words, the poorer ones come to the Patent office because the other departments are paying so much larger salaries. Where, in the Patent office they start at \$720 per year, in the other departments they start at \$900, \$1000 and even \$1200.

In the examining corps the situation is just as bad. In the War department, in the Navy department and in the Department of Justice there are patent employees who receive salaries from \$3500 upwards. Compare these with the examining corps of the Patent office, paid from \$1500 to \$2700.

High-Grade Service Required.

In the Patent office there are 94 assistant examiners of the lowest grade, starting in at \$1500 a year. These examiners have to pass a three-day examination, which is the hardest given by the Civil Service. The technical examining corps of the Patent office comprises 437 scientifically trained college graduates, who are also legally trained, all of whom are men, except about half a dozen.

Lost Half Its Force.

College graduates take this examination for the benefit of receiving the Patent office training, but after they have been here long enough to obtain their law degrees and become admitted to the bar, they leave for the main reason that they cannot earn sufficient salary upon which to support a family, to say nothing of sending their children to college to obtain the same education which they have had to have to pass the Patent office examination.

The result of these conditions is that in 2½ years the Patent office has lost

one-half of its examining force—231 resignations in 2½ years.

Practically all of these scientifically trained examiners were also members of the bar; their places have been taken by men fresh from college without any legal training. This makes it necessary for the trained men of the Patent office to dissipate their energy in training the inexperienced men, since it takes several years to train even a college man to be a competent assistant examiner.

NOW 56,000 APPLICATIONS IN ARREARS.

A LITTLE over two years ago the Patent office was 15,000 applications in arrears; when the new administration began it was 42,000 in arrears; now it is 56,000 applications in arrears.

Where the resignations from a technical corps for three years average seven per month, and where the work is increasing beyond all expectations, so that in two years the patent application work has increased 37 per cent. and the trademark work 85 per cent., it follows that unless relief is given to the Patent office, it will be impossible to keep it from going further in arrears. At the present time, the Patent office is going 400 cases a week in arrears. This is a national calamity. It needs no illustration to show that this constitutes a serious handicap on the revival of business. In fact, at the very moment when the Patent office should be coming to the relief of the country by opening up new avenues of employment, so as to give employment to the 3,000,000 idle employees, as reported by the recent non-employment conference, the Patent office is so far in arrears that it is retarding industry instead of promoting it.

Better Salaries Needed.

In connection with the foregoing, it may be seen that the only way to stop the continuous stream of resignations is to increase the salaries. H. R. 7077, twice passed by the last House, is designed to remedy the situation by providing slightly larger salaries, and since the same bill which increases the salaries increases the fees, the relief is provided without costing the tax payer a single cent. In fact, even with the increase of salaries there will be a handsome surplus of almost \$300,000 per year over every expense. The present fees paid by an inventor to obtain a patent are \$35; under the new bill the fees will be \$40. (The fee for registering a trademark is \$10, and this fee is not changed.) For the \$40 government fees, the inventor is given a monopoly protecting his invention for a period of 17 years without any further expense to him, such as taxes or annuities, as the foreign countries require. This \$40 covers the complete examination of the case, conferences with the examiner which the applicant is free to have either by himself or by his attorney, the printing of his patent and every expense connected therewith.

(Continued from Preceding Page.)

the bushings of the upper and lower axle center yoke bosses. The brake lever has a spiral cam surface in its face, the exact reverse of that in the upper bushing, this cam lever rotating freely about the knuckle pin. Above the cam lever is placed the operating sleeve, which is free to slide up and down lengthwise of the knuckle pin, but is keyed to the pin in such a manner as to force it to rotate with the pin around the common axis. The basic principle of the brake is shown when a pull exerted on the cam lever causes it to rise upward on the knuckle pin through action of the cam forcing the operating sleeve in the same direction. The cam lever, being free from any other influence than the cam surface, remains constant with the axis of the axle proper, whereas the operating sleeve slides on the back portion of the cam lever to any position impelled by the turning of the knuckle and wheel.

This company has extensive sales territories planned for allotment and according to those who have had the opportunity of examining the brake should do a fine business. Incidentally, this type of brake helped win the Grand Prix.

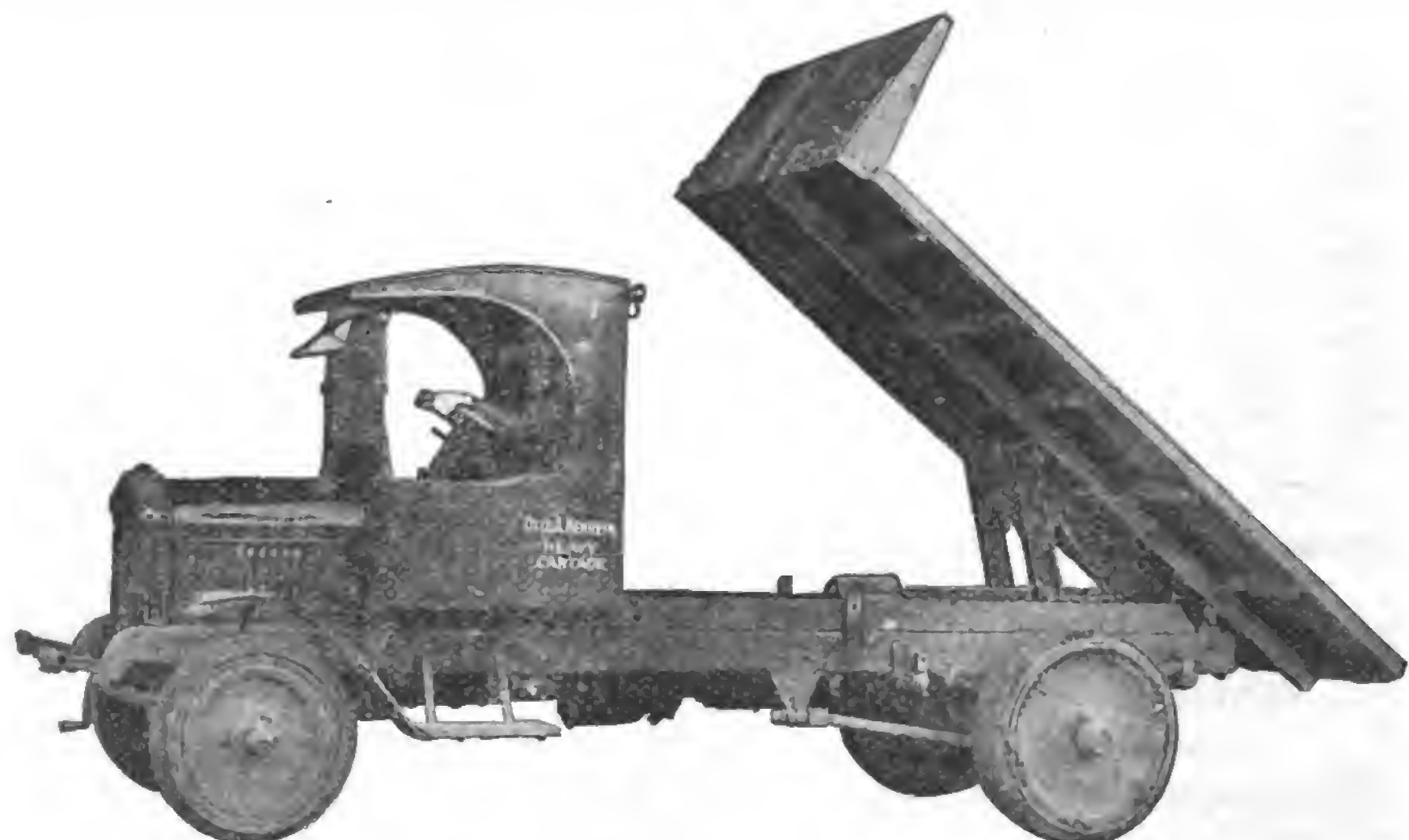
Practical Tools and Equipment

Perfection Horizontal Mechanical Hoists are made in three sizes for one to three, three to five and five to eight-ton capacities and is as near mechanically perfect, the company states, as it is possible to make it. The hoist is operated by a mechanical screw which raises and lowers the load, revolving in either direction

The bracket contains no rivets to come loose and rattle and is bolted with S. A. E. standard bolts, while all the surfaces which fit against the hoist are machined. Every bearing is provided with a bronze bushing fitted with an oiler, while the screw is thoroughly encased, preventing injury from dirt or dust, and provision is

kept from becoming humpy. This in combination with the wipe contact means a perfectly smooth raceway at all times, and absolute contact at all speeds.

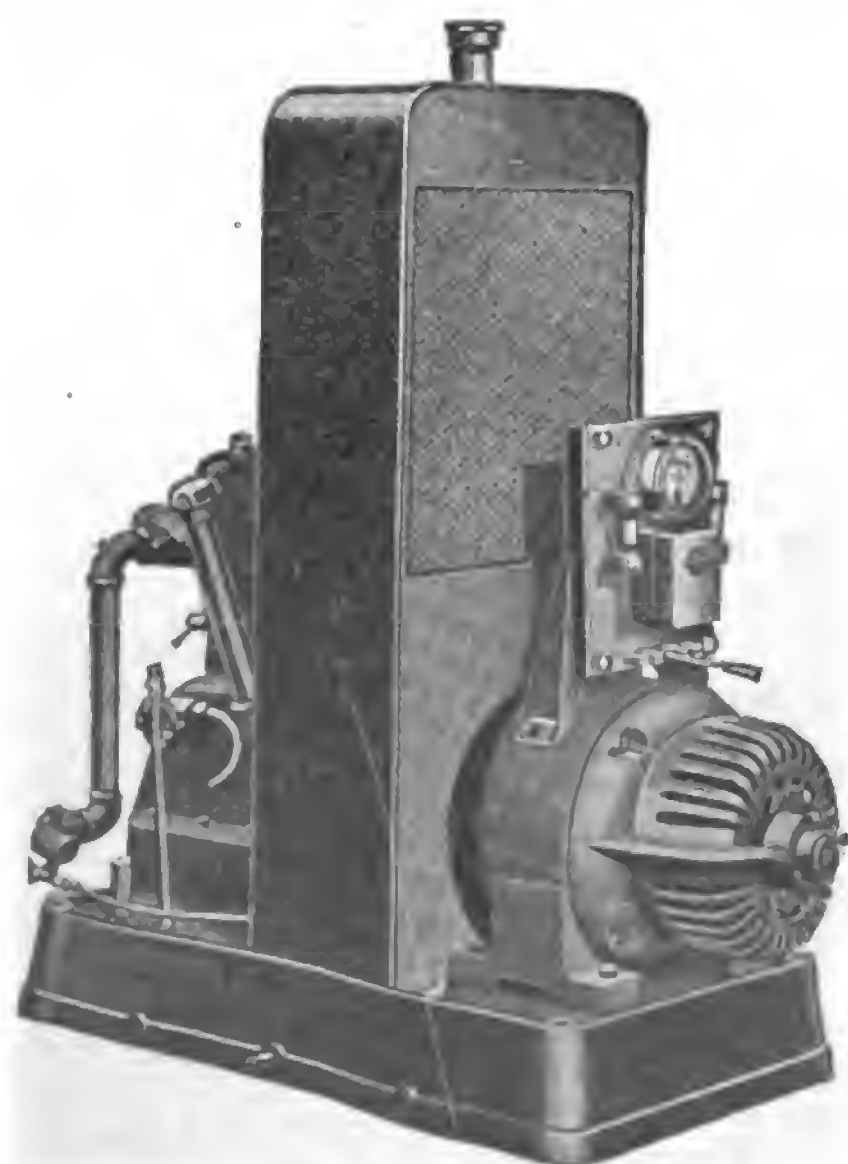
The brush is triangular in shape and slides instead of rolling on the fiber raceway. It is made of carbon steel, heat-treated and hardened to give it longer life, and is so shaped that the arcing takes place on that part of the brush which does not come in contact with the steel segments, so that pitting of the roller or seg-



as desired and under instant control of the driver at all times. Heavy steel cables are attached to the arms that raise or lower the body, which insures positive operation.

An automatic stop is fitted at each end of its stroke and the hoist can be thrown in or out of gear at any time during its operation. The hoist is self-locking and will hold the load at any angle up to 45 degrees.

The Perfect-Lite and Power Plant for the farm or isolated service stations consists of a five-horsepower gasoline engine direct connected to a 1½-kilowatt direct-current generator mounted en bloc



with an elevated radiator of the conventional type mounted between.

The parts of this engine are interchangeable with those of the Ford engine, which simplifies the obtaining of replace-

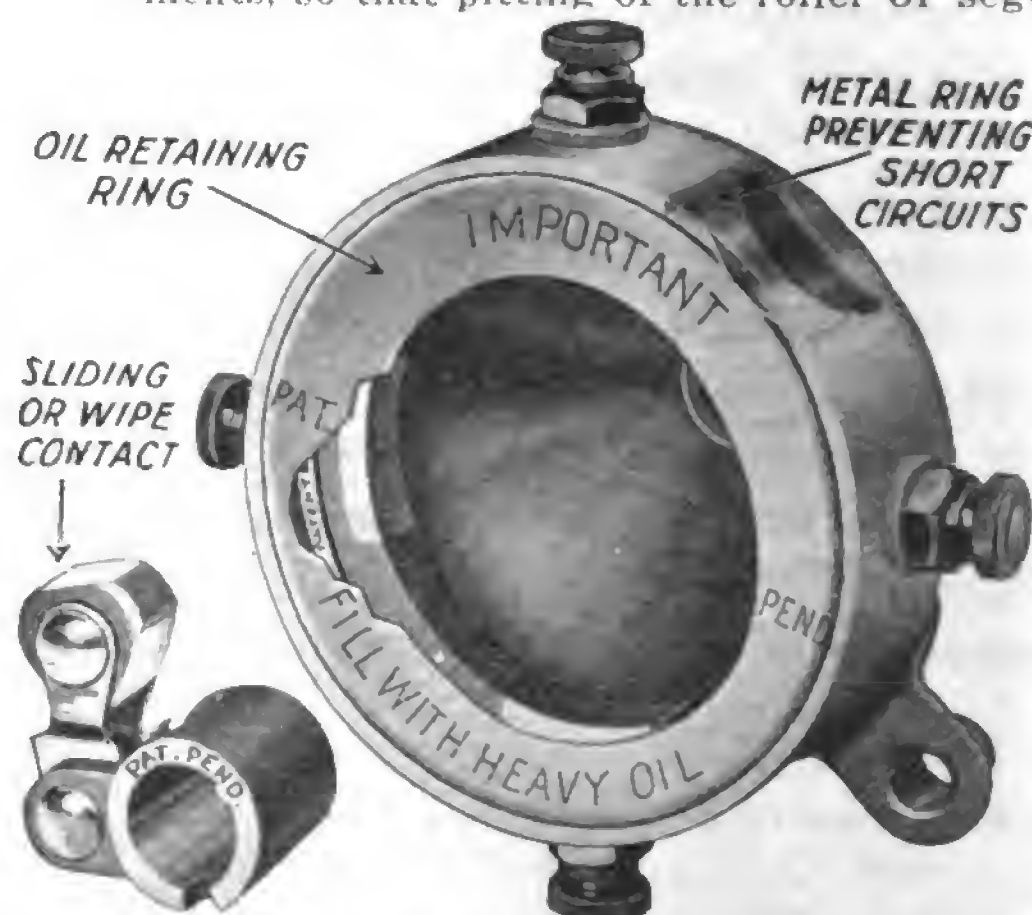
ments parts when they are required. Either gasoline or kerosene may be used as fuel as no changes are necessary for the engine to use either.

Manufactured by the Perfection Hoist & Engine Co., Two Rivers, Wis. Prices: 2T, one to three tons' capacity, \$330; 3T, three to five tons' capacity, \$360; 5T, five to eight tons' capacity, \$450; all f. o. b. factory. Hinge pins, brackets and body guides for all models furnished as extras if desired.

The operating costs are considered very low as the total cost of oil and fuel for a month's use is said to be less than \$2 and the generator, in connection with the storage battery unit which is a part of the outfit, is capable of handling the regular number of lights, or of performing many of the smaller motor-operated jobs about the farm or service station. The battery, a type GB, is designed especially for farm-lighting purposes and is guaranteed for five years. It cannot, it is claimed, be injuriously sulphated even though left for an extended period without charge and has many other points which make it superior, while discharge rates three times the normal eight-hour rate are said not to injure the battery.

Manufactured by the Perfection Hoist & Engine Co., Two Rivers, Wis. Price, including 150 ampere-hour battery, \$545. Other sizes of 102, 115 and 134 ampere-hour capacities may be had at prices ranging from \$675, \$950 and \$1150 respectively.

The McCulloch Wipe Contact Timer for Fordson tractors, Ford cars and trucks, offers the following distinctive features: The raceway is of McCulloch patented construction, made of four pieces of rock grain fiber, accurately locked in the retaining ring. These are so cut that the brush is running against the grain, just as wood paving blocks are laid with the grain vertical in order to resist wear, and



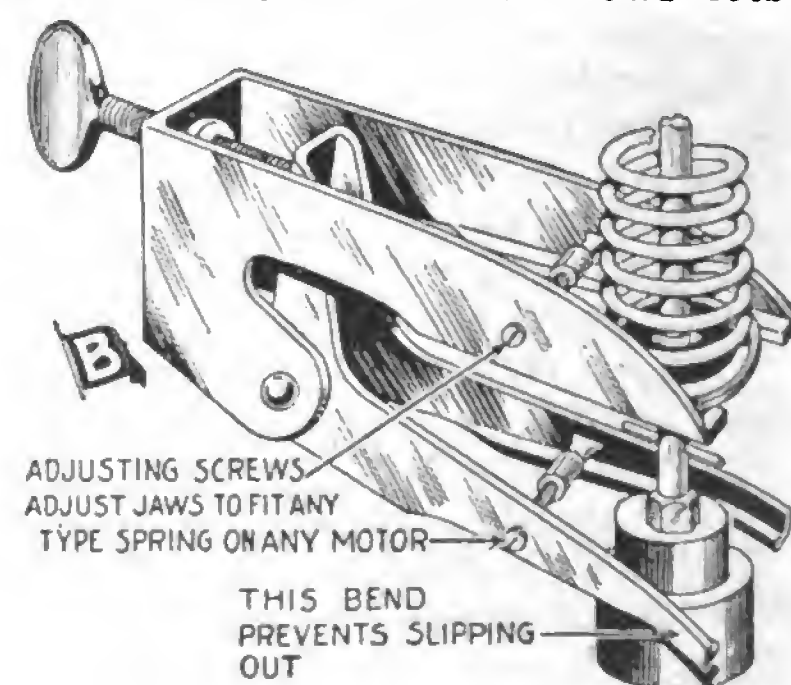
ments, a form of trouble common to roller type timers, is entirely eliminated.

An oil ring is pressed into the face of the shell so as to keep a supply of oil in the timer and ensure lubrication of the wipe contact brush. The timer is positively guaranteed not to short circuit in oil.

All timers are tested twice for short-circuiting when being assembled, and are fully guaranteed against defects in material or workmanship, and to give perfect satisfaction.

Guaranteed and manufactured by the McCulloch Manufacturing Co., Boston, Mass.

The Sunnen Universal Valve Lifter can be adjusted to fit any motor. The upper jaws can be made to take any valve spring seat and the lower jaws to rest on push rod; the push rod guide, or in cases where the guide comes too close up to the spring, can be expanded to go over the guide and rest on the block. This allows lots of



room for removal of pin. The lifter can be swung around in any position and will not slip out. The heaviest valve spring can be raised with ease.

Guaranteed to give satisfaction or money back.

Manufactured by the Banner Accessory Manufacturing Co., 2620-31-33 La Salle Street, St. Louis, Mo. Full information on request.

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

The Yankee Cutter, No. 2000, is designed especially for cutting leather belting and brake lining, giving a quick, clean cut,



which prepares the belt immediately for lacing without the necessity of truing with a knife. Belts up to six inches in width and three-eighths of an inch thick are easily and quickly cut with this device.

The power to operate it is secured through a rack and pinion movement actuated by a lever. The bevel and cutting edges of the knives are the result of careful study and experiment for this special line of cutting, insuring durability, clean cutting and ease of operation.

Adjustable guides are provided on the base and frame of the cutter to insure the work lining up at right angles to the knives, when cutting curved or flat belt stick or brake lining. The cutter should be fastened to the floor or bench by means of lag screws in such a manner that tipping is prevented.

Manufactured by North Brothers Manufacturing Co., Philadelphia, Pa. Prices and literature on application.

The "E S C O" Double-Faced Flaring Tool is a new accessory which has been designed for flaring either copper or brass tubing. It is double-faced, self-opening and with one blow gives the proper flare and taper to either copper or brass tubing. It is made in four sizes as follows:

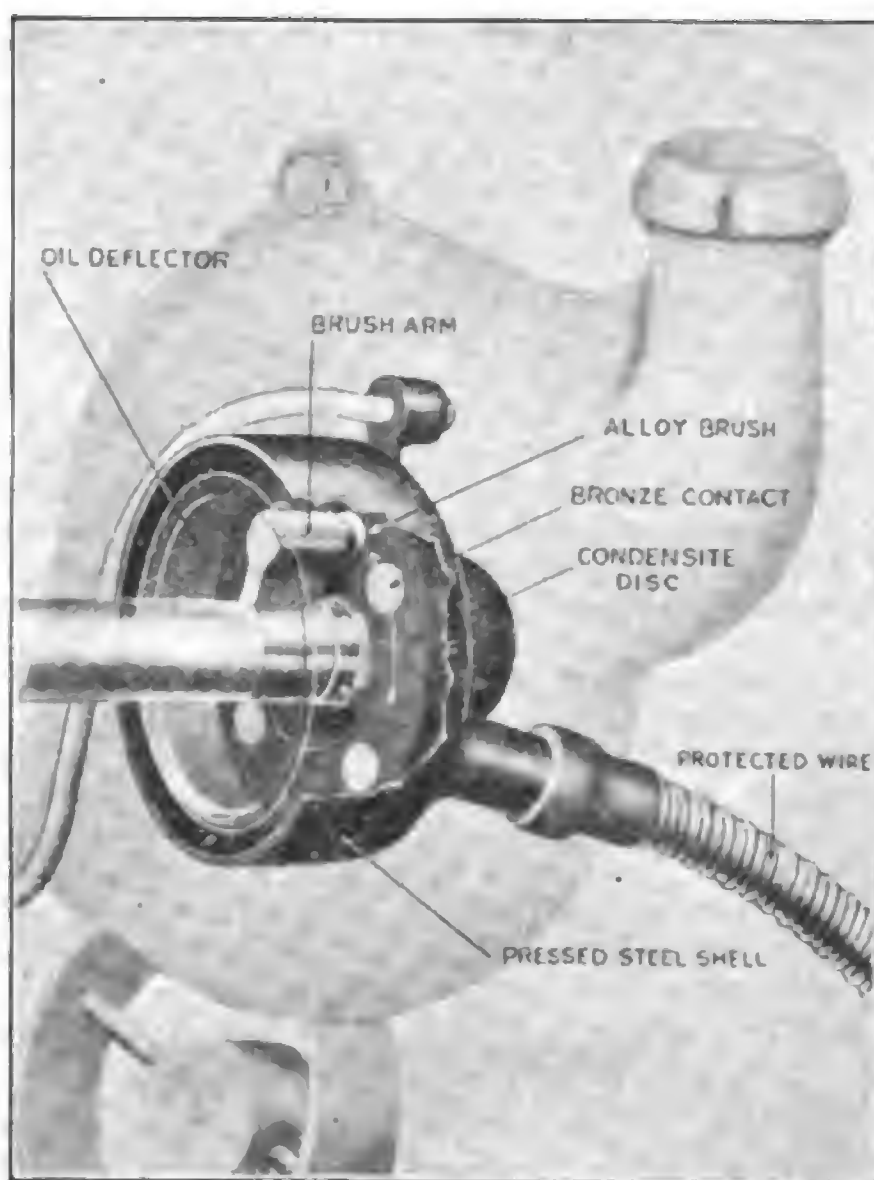


3/16, 1/4, 5/16 and 3/8-inch respectively, and is claimed to flare the tube without the possibility of splitting or cracking.

Service stations find that this device provides a better method of cupping pipe ends and that the possibility of doing a better job and saving time is greatly increased.

Manufactured by the Esco Manufacturing Co., 228 Farnsworth Street, Detroit, Mich. Price, with complete instructions as to use, \$3.25.

The Big "T" Timer for Fordson tractors, Ford cars and trucks, is arranged similarly to a distributor, it is claimed, and should embody the same reliability and permanence. The heavy pressed steel shell is water-tight, solid and indestructible. A thick condensite disc, with bronze contacts moulded in place, is bolted to the shell forming a single unit of shell, wire, conduit and terminals ready for installation. The deflector prevents any oil from working into the timer from the cam shaft bearing at the rear, and the flexible metal conduit with rubber ferrule ex-



cludes water, oil and dirt from the front of the timer, assuring freedom from foul contacts and short circuits. A compression spring provides light tension to hold the special alloy brush in contact with the disc.

The Big T timer is guaranteed to give entire satisfaction, to start the Ford or Fordson engine more easily, and allow it to be throttled lower, run more smoothly, economically and to do these things permanently.

Manufactured by the Fortime Products Co., Warren, O. Price, \$5.

The Bright Star Wash and Towels is a combination liquid wash and paper towels proposition—one of the up-to-date automobile accessories. No matter how soiled with dirt or grease the hands may be, pour a little Bright Star on and it will form a lather the same as the best grade of soap. No water is needed—just pull a towel from the can, dry the hands and



they will be clean and smooth. The liquid in this combination contains no grit and is antiseptic and sanitary. The towels are made of the best material obtainable. When the supply of wash and towels in the can is exhausted, refills are obtainable and easily put into the patented container.

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

Manufactured by the Bright Star Sales Corporation, 221 North Camac Street, Philadelphia, Pa. This product is marketed through reliable automobile stores, garages, sporting goods dealers, etc. Prices and information on request.

The Ambu Separator Remover is a new tool, marvelous in its simplicity and wonderful in its usefulness, an illustration of which is shown.

Any one who has ever had the job of tearing apart a battery knows how useful this tool will be to slip in between



the plates and the separator, with the teeth side of the blade next to the separator. A pull brings out the separator with the blade.

Manufactured by the American Bureau of Engineering, Inc., 1601-03 South Michigan Avenue, Chicago, Ill.

The Nojak is a new device invented by Lynn Beadle of Detroit and is intended to replace the old style automobile jack. It consists of a steel casting weighing about six pounds and is inserted in two small holes bored in the felloe of a motor vehicle wheel. The car or truck owner then simply drives a few feet ahead or back



until the wheel rises on the Nojak. With this device the wheel can be lifted into position for easy tire changing in about seven seconds. Also a Nojak serves as a spare tire guard and a mud or sand hook for driving through heavy roads.

Made by the Commercial Manufacturing Co., 1489 East Fort Street, Detroit, Mich.

The Ambu Battery Box Scraper, shown in the illustration, will be found very useful in removing the compound in battery



boxes, as well as in a dozen other ways in the battery shop. At its low price every battery man will want to have one or two at least.

Manufactured by the American Bureau of Engineering, Inc., 1601-03 South Michigan Avenue, Chicago, Ill.

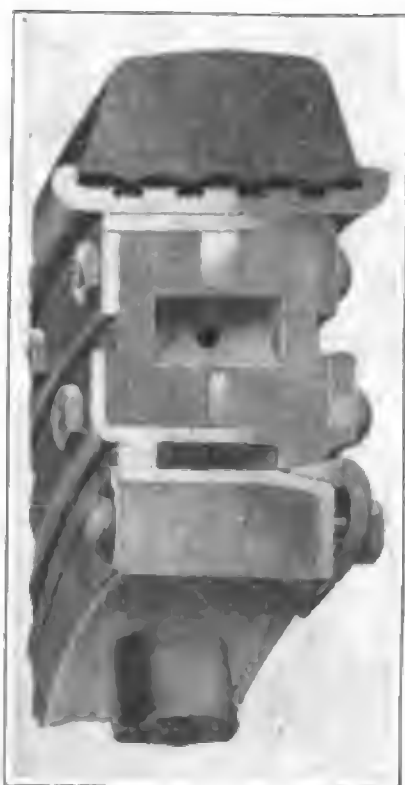
The Morand Demountable Cushion Element for motor trucks marks a distinct advance in this type of wheel equipment, because it gives the durability of the solid tire plus that resiliency so necessary to the life of the truck. By absorbing road shocks and jars, Morand demountables prevent crystallization of the truck's mechanism, eliminating expensive replacements. The statement is made that the resilient cushion element will last for the life of the truck.

One man, it is claimed, can install four Morand demountables in less time than would be required to change one Giant cord pneumatic tire, using ordinary tools.



The rim is interchangeable with and replaces any pneumatic truck tire without the necessity of changing the wheel, and fits any standard S. A. E. pneumatic center.

The dominant idea of the construction of the Morand cushion wheel is a resilient rubber cushion bolted top and bot-

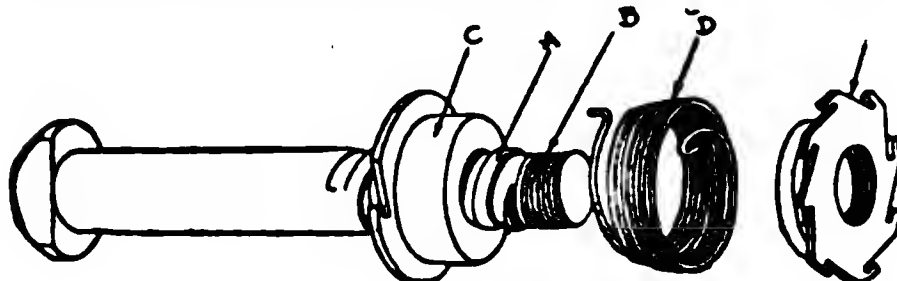


tom, in steel channels and interposed between the felloe and solid tire base. In action it provides for the equal distribution of resiliency throughout the entire circumference of the wheel, thus permitting greater speed with perfect safety.

Manufactured by the Morand Cushion Wheel Co., 800-902 South May Street, Chicago, Ill. Circulars and prices on request.

The Automatic Connecting Rod Bolt has been especially designed to take the place of the conventional stud bearings bolt, nut and cotter pin, and is provided with right and left-hand threads with coil spring, which automatically takes up the wear of the bearing. The bolt is placed between the halves of the bearing in the usual manner, after the shims have been inserted between the halves, and the nut

marked "C" turned down against the bearing cap. The spring "D" is next placed in position with the lower hook end engaging the slot on the nut. The left-hand nut, "E," is next run on the left-hand thread and the upper hooked end of the

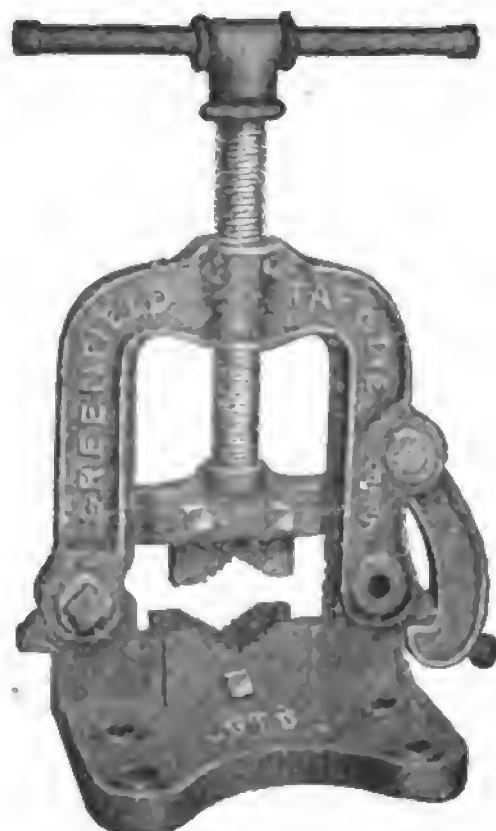


spring placed in the slots on the rim of the nut after proper tension has been given to the coiled spring to take up the wear through the lower nut as it occurs in the bearing. The statement is made that this type of nut and spring fastening automatically takes up wear between the two halves of the bearing and that there is no possibility of the nuts or spring becoming loose.

Automatic bearing bolts are also being designed for other bearings of the engine and will soon be placed in production.

Manufactured by the Automatic Bearing Co., 751 Otis Building, Chicago, Ill. Prices and literature on request.

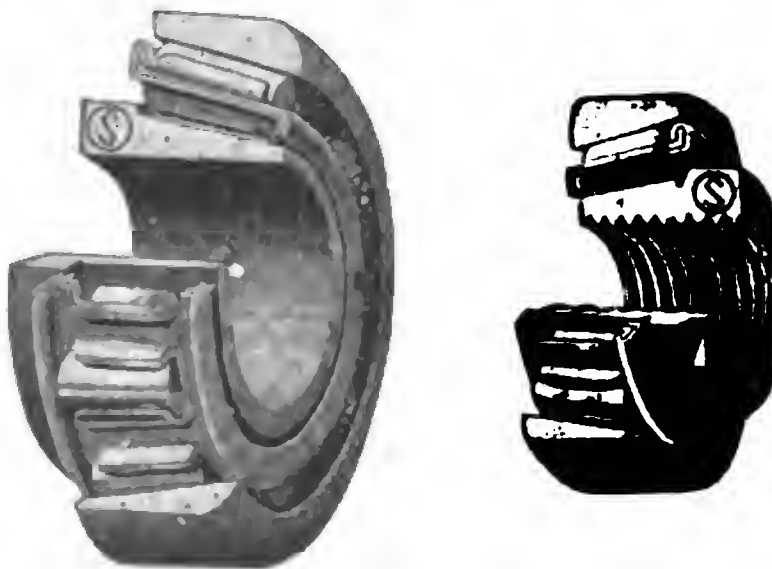
The G T D Hinged Pipe Vise, with reversible hook for holding round stock either hollow or solid, offers service stations and garage owners a device which has proved practical through many years of use. The vise is a bench tool virtually but can be bolted to any convenient post for securely holding long pipe or stock for cutting.



The jaws are made of carefully heat-treated tool steel and are replaceable. The hook and frame may be adjusted to open from either side. Four sizes are manufactured to take stock or pipe from 1/2 inch to 4 1/2 inches in diameter.

Manufactured by the Greenfield Tap and Die Corporation, Greenfield, Mass. Prices and literature on application.

F. W. S. Everlasting Roller Bearings for Ford and Chevrolet front wheels solve the bearing problems of these two trucks, preventing undue wear, and prolonging the life of the bearings. In the F. W. S. roller bearings the load of each roller is distributed over two lines the full length



of the roller and the wear-resisting qualities are claimed to be correspondingly greater. The roller cages or separators

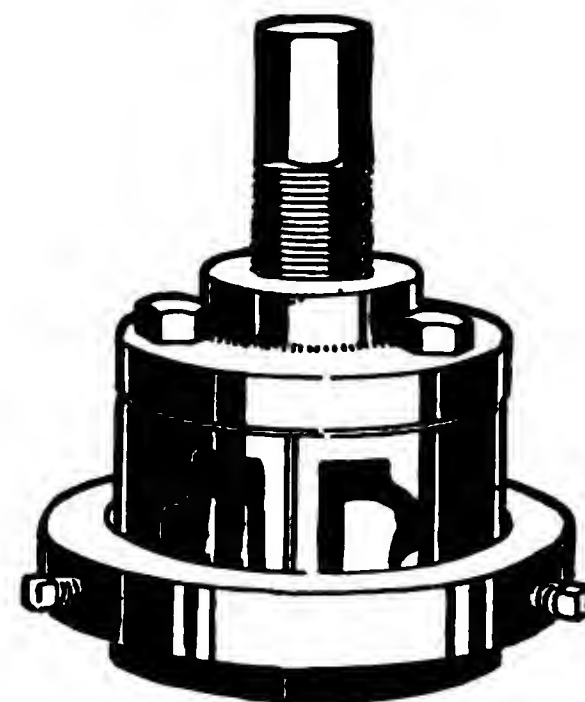
(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

are hardened pressed steel of great strength, so designed that the rollers are constantly maintained in proper position without wear or friction. The hubs are interchangeable with the regular Chevrolet and Ford hubs without machining or cutting any part of the wheel.

End thrust ball bearings for the Ford and Chevrolet 490 differential are also made by this company, which take the place of the regular solid washer. The balls are directly underneath the points where the driving pressure is exerted, eliminating any possibility of springing under heavy loads. The bearing is made in such a manner that it can be taken apart and reassembled without injury.

Manufactured by the F. W. Stewart Manufacturing Corporation, 345 West Austin Avenue, Chicago, Ill. Prices and literature on request.

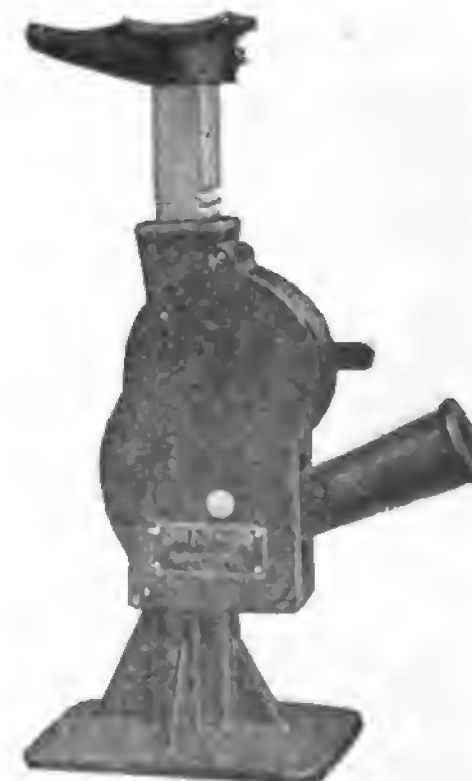
The McClarran Pinion Puller is a tool for removing pinion gears. Numerous tests have demonstrated that the average pinion gear can be removed with this tool in six minutes. It clamps evenly and with a vise-like grip around the pinion gear and is locked in position by slip ring. A



heavy screw plunger engages the end of the shaft, and a turn of this plunger, with an ordinary monkey wrench, draws the pinion. It is adjustable to various sizes and fits any size of pinion gear.

Manufactured by the McClarran Motor Car Co., Greensburg, Pa. Price on request.

The Chicago King Lifting Jack is designed for heavy passenger car and light truck service up to two tons' capacity. A special feature of the jack is the instant release of the jack, which overcomes the necessity of having to pump it down after being elevated. Its height, raised, is 17 inches, and lowered, 11 inches. The state-



ment is made that the Columbia University laboratory has tested this jack to 7000 pounds without developing defects.

The Chicago King jack is especially noted for its easy lifting qualities, a feature which especially recommends it for motor truck and heavy passenger car use.

Manufactured by the William E. Pratt Manufacturing Co., 190 North State Street, Chicago, Ill. Prices and literature on application.

Recent Revisions of Truck Prices

Akron Multi.				Federal.				Piedmont.			
Model and Capacity	Old	New	Change	Model and Capacity	Old	New	Change	Model and Capacity	Old	New	Change
20, 1½-ton.....	\$1995	\$1695	\$300	SD 1-ton	2500	1800	700	4-30 1½-ton	1785	1685	100
American.				TE 1½-ton	2775	2175	600	Pony.			
40, 4-ton	4575	4275	300	UE 2-ton	3025	2425	600	¾-ton	320	400	*60
Atlas Merchant Dispatch.				WE 3½-ton	3950	3150	800	Rainier.			
21, 1-ton	1550	1185	365	Ford.				¾-ton	2150	1990	160
Atterbury.				TT 1-ton	495	445	50	1-ton	2350	2150	200
2OR 1½-ton.....	2775	2475	300	Golden West.				1½-ton	2600	2490	110
7CX 2½-ton	3375	3175	200	HA 7-ton	5500	6000	*500	2-ton	2950	2890	60
7D 3-ton	4175	3975	200	G. M. C.				2½-ton	3600	3550	50
8E 5-ton	5575	4975	600	K-16 1-ton	1995	1495	500	2½-ton (177 W. B.)..	3750	3650	100
Available.				K-41 2-ton	3250	3000	250	3½-ton	4500	4400	100
H-1½ 1½-ton	2750	2475	275	K-71A 3½-ton	4500	4250	250	5-ton	5250	5100	150
Bell.				K-101 5-ton	5100	4650	450	Reliance.			
M 1-ton	1495	1650	*245	Gramm-Bernstein.				10-A 1½-ton	2500	2400	100
E 1½-ton	2100	2250	*150	15 1½-ton	2250	2050	200	20-B 2½-ton	3200	3190	100
O 2½-ton	2550	2750	*200	65 1½-ton.....	2775	2725	50	Reo.			
Brockway.				20 2-ton	3275	3175	100	1½-ton	1385	1245	140
T 5-ton	5250	4750	500	25 2½-ton	3875	3575	300	Republic.			
E ¾-ton	1750	.....	.....	30 3-ton	4775	4525	250	75 ¾-ton	1395	1250	140
Capitol.				35 3½-ton	4775	4375	400	10 1-ton	1695	1395	300
G-1½ 1½-ton	2750	2975	*225	50 5-ton	5875	5275	600	Ex. chassis 1-ton...	1995	1695	300
H-2½ 2½-ton	3450	3700	*250	G. W. W.				10 Express 1-ton...	1995	1795	200
K-2½ 2½-ton	3850	4250	*400	1½-ton	2100	1950	150	Rapid Transit ¾-ton	1395	.....	.....
M-3½ 3½-ton	4150	4225	*275	Hal-Fur.				11X 1½-2-ton	2295	1795	500
Champion.				1½-ton	2350	2200	150	2½-3-ton	2795	2195	600
¾-ton	1100	1175	*75	2½-ton	3250	3000	250	20 3½-4-ton	3845	3095	750
Chevrolet.				3½-ton	4250	4000	250	Signal.			
G	820	745	75	Harvey.				1-ton	2475	1950	525
T	1225	1125	100	3½-ton	4300	3950	350	1½-ton	2925	2450	475
490	625	525	100	5-ton	5200	4500	700	2½-ton	3275	2875	400
Clydesdale.				Hawkeye.				3½-ton	4275	3675	600
42 1½-ton	2750	2475	275	1½-ton	2365	1850	515	5-ton	5300	4400	900
65X 2½-ton	3450	3250	200	2-ton	2915	2650	265	Standard.			
65EX 2½-ton	3775	3450	325	3½-ton	4345	3700	645	1-K 1½-ton	1800	1600	200
90 3½-ton	4400	4100	300	Hendrickson.				1-K 1½-ton, pn. tires	1800	.....	.....
120B 5-ton	5500	4500	1000	2½-ton	3300	3150	150	76 2½-3-ton	2800	2400	400
120C 5-ton	5500	4500	1000	3½-ton	4200	3975	225	66 3½-4-ton	3600	3150	450
Concord.				Huffman.				86 5-6-ton	5250	4400	850
A 1½-ton	2350	3150	*800	B 1½-ton	2075	1995	80	Sterling.			
B 2½-ton	2850	3600	*750	C 1½-ton	1875	1795	80	1½-ton	3200	2885	315
Corbitt.				Indiana.				2-ton	3500	3085	415
D Special 1½-ton....	2400	2200	200	12 1½-ton	2290	1745	545	2½-ton	3650	3290	360
C Special 2-ton.....	2800	2600	200	20 2-ton	2950	2985	*35	3½-ton	4600	4325	275
C 2-ton	3500	3150	350	25 2½-ton	3525	3375	150	5W 5-ton	5500	4950	550
B 2½-ton	3650	3300	350	35 3½-ton	3750	4085	*335	5C 5-ton	6000	5500	500
A 3½-ton	4500	4100	400	51 5-ton	4775	4825	*50	CD 7½-ton	6500	6000	500
AA 5-ton	5500	5000	500	Inland.				Superior.			
Cyclone.				D 2-ton	2850	2950	*50	D 1-ton	1800	1650	150
1½-ton	2800	2685	115	Keystone.				E 2-ton	2750	2600	150
Day-Elder.				40 2-ton	2550	2450	100	Timb.			
A 1-ton	2100	1600	500	Kimball.				GW 1½-ton	2695	2400	295
B 1½-ton	2300	2000	300	A-K 3-ton	4400	4500	*100	MW 2½-ton	3580	3100	480
B Special 1½-ton....	.....	2500	.....	Kissel.				PW 3½-ton	4760	4100	660
D 2-ton	2750	2400	350	Gen. Utility 1½-ton..	2775	1975	800	Tower.			
C 2½-ton	3025	2750	275	Freighter 2½-ton....	3475	2875	600	1½-ton	3000	2900	100
F 3½-ton	3750	3150	600	Heavy Duty 4-ton....	4475	3675	800	2½-ton	3475	3200	275
E 5-ton	4875	4250	625	Goliath 5-ton	5065	4085	1000	3½-ton	4400	4100	300
Defiance.				Express 1-ton .....	.....	1585	.....	Transport.			
1-ton	1975	1695	280	Koehler.				20 1-ton	1850	1395	455
1½-ton	2550	2095	455	D 1½-ton	2285	1885	400	30 1½-ton	2250	1995	255
2-ton	2750	2275	475	M 2½-ton	3365	2875	490	3½-ton	4195	3885	310
Denby.				MCS 2½-ton	3450	2975	475	Traylor.			
12 1-ton	2150	2000	150	F 3½-ton	4450	3985	465	E 4-ton	4700	4450	250
34 2-ton	2800	2600	200	Larrabee.				F 5-ton	5100	4700	400
25 3-ton	3600	3300	300	K 2½-ton	3400	3200	200	Triangle.			
27 4-ton	4600	4200	400	L 3½-ton	4200	4000	200	AA ¾-ton	1600	1385	215
210 5-ton	4850	4500	350	W 5-ton	5100	4800	300	A 1½-ton	2450	2350	100
214 7-ton	6200	5500	700	L. M. C.				C 2-ton	2850	2700	150
Diamond.				2-20 2½-ton	2950	2540	410	B 2½-ton	3150	2950	200
T 1-ton	2500	1975	525	Maccar.				Union.			
T-T 1½-ton	2650	2250	400	L 1½-ton	2925	2700	225	FW 2½-ton	3159	3490	*340
T-FS 1½-ton	2960	2525	435	H-A 2-ton	3300	3100	200	HW 4-ton	3975	4485	*510
T-U 2-ton	3285	2650	635	H-2 3-ton	3650	3400	250	JW 6-ton	5400	5800	*400
T-K 3½-ton	4675	3750	925	M 4-ton	4500	4200	300	Vim.			
T-E 5-ton	5400	4325	1075	G 5-6-ton	5500	4950	550	½-ton	1355	1050	305
T-S 5-ton	5650	4500	1150	Noble.				SC ½-ton	1550	1175	375
Doane.				1½-ton	2585	2400	185	1-ton	2475	1975	500
2½-ton	3750	4100	*350	2-ton	2825	2675	150	Walter.			
3½-ton	4800	5100	*300	2½-ton	3150	2950	200	3½-ton	4950	4550	400
6-ton	5825	6000	*175	3½-ton	4030	3800	230	5-ton	5600	4850	750
Douglas.				Olds-Economy.				7-ton	6000	5350	650
1½-ton	2050	1850	200	With cab 1-ton.....	1325	1175	150	10-ton tractor	5600	4850	750
3-ton	3250	2950	300	With ex. body 1-ton.	1395	1245	150	White Hickory.			
Facto.				Packard.				E 1-ton	2450	1225	1225
2½-ton	2895	2295	600	EC 2-ton	3700	3500	200	H 1½-ton	2750	1375	1375
Fageol.				ED 3-ton	4450	4100	350	K 2½-ton	3350	1675	1675
1½-ton	3400	3000	400	EF 5-ton	5550	4500	1050	2½-ton	3450	1725	1725
Famous.				EX 2-ton	4200	4000	200	Wilcox.			
B-10 1-ton.....	1795	1800	*5	Pierce-Arrow.				1-ton	2100	1900	200
B-12 1½-ton	2195	2100	*95	2-ton	3750	3200	550	1½-ton	2775	2550	225
*Increase.				3½-ton	4950	4350	600	2½-ton	3300	3000	300
				5-ton	5700	4850	850	3½-ton	4250	3950	300
								5-ton	5200	4350	850

Reduces Delivery Expenses

Bakers Enthusiastic Users of Commercial Vehicle Which Has Almost Entirely Done Away with Horse-Drawn System—Large Fleet Used by Centralized Plants

THE centralized bakery, catering to a large territory, making a specialty of bread baking, is fast becoming an industry of great magnitude. Starting in a small way a few years ago practically all the pioneers in this field have succeeded. Thanks to the motor truck, they have quickly outgrown the quarters in which they originally started and at the present time occupy large buildings, of one or more floors, which are given over entirely to this one branch of the bakery business.

IN THE East, probably the first to enter this field on a large scale was the Ward Baking Co., with headquarters in New York City and branches in every large city up and down the length of the Atlantic sea board. Others seeing the success of this company quickly followed their foot steps with the result that today there are several large companies of this character operating in the large eastern cities, with still others entering the field as they can become organized and receive charters.

A large number of the more progressive bakeries have combined to conduct business on a large scale and meet the competition from these "chain" bakeries, so-called, and are finding competition unusually keen. To meet this condition and retain their share of the baking business, certain of the chain bakeries are operat-

ing on a stock-selling basis, selling stock in the local branch to grocers, market men, lunch rooms and others who use their goods. Once started, the grocer or market man will naturally continue to be a customer, as it is for his interest to help the concern in which he is financially interested, thereby increasing the year's business and augmenting his own stock dividends at the end of the six-month or yearly period, depending upon how often a "melon is cut" by the company.

Business Increased Through Trucks.

The bakery business of the later-day type calls for early morning delivery before the stores open to catch the trade of the busy house wife, before breakfast as well as throughout the day. This means early rising for the drivers, a long drive to outlying towns before delivery commences, and summer and winter work regardless of weather conditions.

To meet these conditions and cover the route on time the truck must be in the pink of condition mechanically, be able to stand the gaff of winter driving over snowy, drifted roads, or through slush and mud which are very trying to the truck's mechanism. Trucks for this service must be staunchly constructed and of a quality which will withstand the hard, consistent service without giving trouble.

One finds that two elements enter into trucks sold to baking concerns. In ordering new trucks the purchasing agent of the company knows what he wants and why he wants it. Accurate cost figures are kept of each truck's performance throughout the year and from these sheets he is able to tell at a glance which

truck of several different makes in the fleet are performing the best. That truck is usually duplicated as other trucks are purchased and trucks which show a low-grade performance are traded, so that eventually the company owns a fleet of trucks of one make entirely. Service and dependability are the two elements which enter largely into the choice. The reliability of the company servicing the truck locally is a very important item as many calls must naturally be made in the course of a year for new parts, service, etc. Economy of operation, including gasoline and oil mileage, are items that are not neglected by the purchasing agent, although they do not figure as large as dependability and service. The ability of the truck to get through on time, deliver its load and return, is of prime importance.

Much of the truck's successful performance depends on the driver. As operators differ greatly in their method of driving, truck performance will vary accordingly. Therefore a truck that may not show up as it should with one driver may give a good account of itself with another.

No Standard Truck Chosen.

There seems to be a wide divergence of opinion among the large baking concerns as to the type of truck best suited to the business. All kinds and makes of trucks are found in use from the Ford ton size up to those of 1½ and two tons capacity, depending upon the bulk of the load and the distance travelled. The electric truck is used extensively for city service where the routes are short, the stops numerous and close together; while for more distant points the gasoline-propelled truck is employed almost exclusively where the stops are farther apart, and it is desirable to cover the intervening distance quickly.

The day's work for the drivers is over as soon as they reach the fleet station of the bakery after unloading their empties and turning over their cash receipts for the day, many of them getting done at 2:30 to 3 p. m. The truck shown in the illustration is a G. M. C., which has been in use by the Herrington Bread Co., Inc., Glenwood avenue, Great Falls, N. Y., since March 12, 1921. During this period the truck has been in use constantly, covering 772 miles each week, performing road work in the outlying towns during the day time and city work during the night. The load shown in the picture consists of 39 boxes, each weighing 32 pounds and containing 50 loaves of bread weighing 1½ pounds each, making a total of 4273 pounds a load. This truck is bound for Schroon Lake, N. Y., by the way of Lake George and Bolton, N. Y.



All Kinds of Trucks Are Used in the Bakery Business and There Seems to Be No Special Make That Is Chosen for This Work.

THE MOTOR BUS FIELD

*A DEPARTMENT DEVOTED TO THE
INTERESTS OF MAKER AND USER*

MANUFACTURE — DISTRIBUTION — OPERATION — DEVELOPMENT — NEWS

ILLINOIS CITY PLANS TO ADOPT BUS.

ROCKFORD, ILL., Dec. 10.—The Rockford City Traction Co. recently placed with the White Motor Co. orders for six chassis to be equipped with bus bodies to be delivered about Jan. 15, 1922. The complete equipment of busses will cost \$42,000 and they are to be operated by the traction company as feeders to the trolley lines, being assigned to suburban districts which are not covered by the trolley company's lines.

All patrons will be given transfers to the trolleys without extra charge. This move on the part of the street railway company marks the latest development in the trolley situation in Rockford and will undoubtedly show good results.

The front entrance of the type of bus recently ordered has a width of 25 inches and is reached by two short steps. The interior width will be 12 feet; the height, six feet, six inches; the length, 15 feet. Each bus will carry 25 passengers comfortably. The wheelbase will be 198 inches.

Citizens of this city are said to unanimously favor the project.

PUBLIC WILL DECIDE FATE OF BUSES.

DES MOINES, IA., Dec. 9.—Courts in this city and Chicago were recently occupied in deciding the bus-street car issue. In Des Moines the public will be asked to vote on a franchise which is planned to restrict bus competition and permit the resumption of trolley service after 11 weeks of idleness. The new franchise calls for trolley operation under a service-at-cost arrangement with an initial eight-cent cash fare, to be lowered whenever the readjustment of fares is necessary.

The Federal court in Chicago was called upon to decide, a few weeks ago, whether the street car system in Aurora, Elgin and other towns in the Fox River valley district should be compelled to operate at a loss in competition with bus transportation. The public in the communities through which the trolleys operate was asked to show cause why the street car lines should not be discontinued, since they have been operating under a receiver and at a heavy loss, due to bus competition.

Under the proposed plan in Des Moines, no dividends will be paid on common stock while the cash fares are in excess of seven cents. Starting at seven

cents, a dividend of three per cent. will be paid on common stock and as fares go down the dividends will increase until common pays seven per cent. whenever a five-cent fare is reached. Provision is also made for fares above eight cents or below five cents whenever conditions warrant. Interest and dividends on outstanding securities except common stock

TEN REASONS

WHY MOTOR BUS IS
SUPERIOR TO
TROLLEY.

F. W. FENN, secretary of the National Motor Truck committee, National Automobile Chamber of Commerce, asserts that the motor bus is more practical than street cars or passenger trains for the following reasons:

1. Greater mobility.
2. Absence of tracks.
3. Ability to continually extend routes to meet newly developed needs.
4. Ease with which routing can be shifted without loss of equipment.
5. Confining of service delays to one vehicle affected when there are mechanical troubles.
6. Possibility of maintaining better schedules and intensive service.
7. Less weight of vehicle per passenger as compared with common electric carriers.
8. Greater efficiency for certain kinds of traffic.
9. Admission to residential thoroughfares closed to the common electric carriers.
10. Service as feeders to more rapid and long electric carriers.

are to be guaranteed, and the city is given the right to purchase the entire system at any time on six months' notice.

Street improvement demands made by the local communities forced the issue as there was no money available for this purpose.

TO DISTRIBUTE BUSES.

LANSING, MICH., Dec. 14.—The Lansing Bus Co. has recently been organized as state distributor, handling a complete line of special bus bodies for all makes of truck chassis.

DECATUR HAS TWO NEW BUS LINES.

DECATUR, ILL., Dec. 8.—Two separately operated bus line not paralleling existing trolley lines have been merged in this city to handle passenger transportation; the Union Transport line, capitalized at \$30,000, with E. E. Houck, president, and R. A. Dillinger, secretary, and the Borden Bus Line, with a capital of \$25,000, and John Borden as president and Floyd Borden as secretary. It is the expectation that these two companies will efficiently handle the field.

The city council has declined to give the Illinois Commerce commission blanket authority to designate the streets upon which the busses can operate. The council reserves the right to make such designation, but has made it clear that the busses may not run on any street served by the trolley lines. It is pointed out that there is abundant territory not reached by the trolleys and it is this field which must be opened by the motor vehicles. It is thought that the compromise measures will permit the trolley lines to make a reasonable profit and will also protect the bus lines.

MOTOR BUS MUST OBEY LAW ON WEST COAST.

WOODLAND, CAL., Dec. 9.—Motor truck and motor bus lines were recently warned that they must obey the laws against over-speeding and over-loading or the highways of the state would be closed against them, the board of supervisors of Yolo county having decided not to issue any new permits nor to renew the old permits when they expire. The Yolo county board of trade and the Business Men's association have also gone on record as supporting the decision of the supervisors.

The resolution adopted by the board of supervisors states that Yolo county has expended \$1,000,000 on highways, and that the State of California has expended \$2,000,000 on similar work within the county; that the trucks and busses cause almost irreparable damage to these roads, often destroying them, and pay nothing for their upkeep, and that, therefore, it has been decided to keep these vehicles off the public roads, "at least until such time as the operators of these lines obey the laws against speeding and over-loading." California has always favored the bus lines and it is hoped that the resolutions will be heeded.

**Journey's End.
Caravan
Arrives in
Beautiful
City Park
of New
Orleans
After a Trip**



**Replete
with
Glorious
Views, Poor
Roads, and
Exciting
Experiences
of Various Kinds.**

“A Thousand Miles of Smiles”

WITH this slogan did the Towles Tours Co. herald the pioneer trip of a motor bus caravan from Chicago to New Orleans. In such a fashion did it seek to attract passengers for this first attempt to carry human beings a distance of close to 1200 miles from the Great Lakes to the Gulf of Mexico. In such a way did it optimistically promote the initial test of the long-distance motor bus caravan carrying passengers. The pleasing words lured hundreds of prospective passengers to inquire as to this novel and distinctively unique method of being transported from Lake Michigan's chilly breezes to the sunny climes of the Southland for the winter months—"Afar from the breath of old Boreas."

THERE were many skeptics who viewed this undertaking with misgivings. Even motorists not inclined to be pessimists said that one couldn't smile when riding more than a thousand miles in motor busses, which heretofore had been used as only casual two-hour conveyances, operating over city boulevards for those desirous of catching a hasty glimpse of the large cities.

But the experiment has come to a successful conclusion. Thirty passengers have actually been carried the entire distance of 1187 miles in three large motor busses. They have not only smiled all the way, but they have actually been landed safely in the city of New Orleans

with even happier smiles adorning their faces than the smiles with which they started from the Congress hotel on Michigan boulevard.

Besides they have learned that this means of seeing the country, of enjoying the scenic splendors of the states traversed and of getting to know the people in the places distant from their own homes, is really the ideal method of travel for those who wish to not only "see," but also to "know" America first.

In addition they have the satisfaction of knowing that their courage in taking this first motor bus pilgrimage of a distance exceeding 1100 miles in length has: First, given a powerful stimulus to the

good roads movement the country over, and particularly to the establishment of main through highways of motor travel; second, activated an idea into a definite plan that will, within a few years, result in the establishment of motor bus lines connecting Chicago with New Orleans that will be for the pleasure and convenience of both tourists and commercial travellers, allowing liberal stopovers at all the larger places en route, such as Danville, Indianapolis, Columbus, Ind.; Louisville, Florence, Ala.; Nashville, Tenn.; Columbus, Miss.; Meridian, Miss.; Bogalusa, La.

This latter result is predicted by Harry J. Morris, general manager of the Towles Tours Co., who has the distinction of not only conceiving the idea of the motor bus passenger caravan, but actually piloting the first successful enterprise of this kind ever attempted in this country.

In the party of pioneers that set out from Chicago Sunday morning, Oct. 23, were an even dozen women, some of them young, some of them past middle age, but all of them asserting at the end of their 13-day trip that, no matter what their years or condition of health at the outset, the conclusion of their long bus journey found them feeling "fine" and



Road Conditions of All Sorts Were Encountered on This Trip, a Few of Which Are Shown in the Illustration—The First, Mammoth Cave Section, Kentucky; Second, Alabama "Highway;" and Third, a Mountain Side, Bowling Green, Ky.

thoroughly satisfied with their enjoyment of the trip. Many of them were in even better health as a result of the days spent in the open air and sunshine.

Itinerary of the Trip.

The first day's run was over 134 miles of a boulevard-like pavement all the way to Danville, Ill., where the first night on the road was spent.

The second day took the party over smooth gravel roads in Indiana through Indianapolis and thence over macadam into Columbus, Ind., where the second night's rest was obtained.

Louisville was the third night's control station. It was reached in a little more than half a day, permitting the tourists to view Kentucky in and around the city of Louisville.

Next day the tourists began hitting the first poor roads and this in the most regrettable portion because they lead into one of the country's great scenic marvels, the huge underground caverns at and around Mammoth Cave. Thirty-six hours were devoted to visiting the caves and country about, including the Lincoln farm.

Leaving Mammoth cave for the fifth night control at Bowling Green, Ky., the caravan tourists were jolted over a stretch of road around Glasgow, Ky., that was made of cobble stones laid by hand over 90 years ago. General Jackson advocated the building of this road to New Orleans as a military necessity. Some of the cobble stones are just as they were laid in that period of long ago, but most of them have assumed an upright position.

From Bowling Green the tourists headed into Nashville, Tenn., for their night stop-over, finding Tennessee's roads leading into Alabama in fine condition. At Florence, Ala., another night stop, trips to the Mussel Shoals nitrate plant and the gigantic Wilson dam project, not to mention an old-fashioned southern barbecue, gave the travellers treats long to be remembered.

The next day's travelling carried the busses over 15 miles of road near Hacklesburg, Ala., that all will soon want to forget. It leads through a forest over



"I'll Sing and I'll Float in My Gum Tree Canoe"—This Bluff Overlooks Tombigbee River, the One Mentioned in the Song—Remember It?

a path all but obliterated by leaves, up and down steep mountain grades, over rickety bridges and antique culverts. Future motorists over this country, however, can find solace in the fact that this detour will be unnecessary by next summer, as a bridge on the Jackson highway destroyed by a tornado, is being rebuilt and is now nearing completion.

So rough were the roads in this section of Alabama that the party was forced to stop for the night at Hamilton, Ala., 18 miles from a railroad station, and with hotel accommodations of the vintage of stage coach days.

In Hospitable Mississippi.

The next night, however, was spent at Columbus in hospitable Mississippi, and it might be noted in passing that the closer the party got to the Gulf the more friendly and hospitable became the residents.

From Columbus the busses sped over good roads into Meridian for the night. The next day took them to Hattiesburg, followed by a jump into Bogalusa and thence into the charming quaint and warm city of New Orleans. Everywhere the travellers were welcomed, entertained and feted in fashion becoming pioneers, though quite unlike the early settlers "Westward Ho." Starting at Dan-

ville the tourists were given dinner after dinner and fete after fete, until they were all overwhelmed by the hospitality and warmth of the entertainment spread for their edification and enjoyment at Florence, Columbus, Meridian, Laurel, Hattiesburg, Bogalusa and Slidell.

At Slidell the party was treated to a dinner that had been gathered by the population at its very door steps. This repast included fish, oysters, quail, duck, squirrel, oranges, grape fruit, pecans, sugar cane and sundry other delicacies, all grown within a few miles of the town.

The Motor Club of Louisiana welcomed the tourists as Slidell officially taking the party off the hands of Cliff Williams, the wealthy Meridianite, whose hobby is to make Mississippi's roads the best in the Union, and who has just been elected president of the Mississippi Valley Highway association.

Mr. Williams, in several speeches at various stopping places between Meridian and New Orleans, assured the motor bus party that the trip was one of the best "boosts" for good roads that has been made in the South in many years.

Not a bit of mechanical trouble marred the entire trip and only once was there a tire change, and this was made at a luncheon stop.

"The operating costs prove that busses can easily be used over the route and make a profitable return to the operators," says Mr. Morris. He allowed 22½ cents a mile to cover maintenance and depreciation on the busses for the trip, as well as for gasoline, oil and the salary of each chauffeur.

Each passenger was carried for less than two cents a mile. Another particularly outstanding feature of the bus operation over the trip lies in the fact that the 10 passenger cars, loaded with baggage, consumed an average of only one gallon of gasoline for each 10 miles.

From the experience gained in this supreme test for the sight-seeing busses of the White Co., it seems that Mr. Morris' prediction that, with a little more good road building and the maintenance of the present roads, within a few years a string of motor busses will be linking the larger cities of the country, just as the steam and interurban railroads now do, bids fair to become a reality.



Where Good Brakes Are a Real Necessity—Section of Road Near Meridian, Miss. This Was a Boulevard Compared to Some of the "Roads" Encountered.

MOTOR BUS LINES PROVE PAYING VENTURES

TROLLEYS RAPIDLY BEING FORCED INTO BACKGROUND AS PUBLIC BECOMES ACQUAINTED WITH UTILITY OF MODERN SYSTEMS

EVEN though the motor bus as a separate branch of the automotive industry is admittedly in the embryonic stages of development, there are already more than 700 organized bus lines in active service and doing a successful business, this not including the much larger number that are engaged exclusively in transporting school children. It is characteristic of the motor car industry to accomplish great works in a short space of time and the fact that the bus business has already grown as few people realize, is merely another instance of this truth.

MARKED efficiency and economy are the predominating factors that have accounted for all great gains in the automotive industry, and the motor bus follows true to the precedent.

Phenomenal development will come with the next few years, and there is indication on every hand that presages the decay of the trolley systems, while at the same time auguring the vast future that is before the motor bus, not only as a developer of urban territories, but as a necessary adjunct to city life.

As pointed out editorially in this magazine from time to time, the present trend of all transportation, both freight and passenger, is toward the internal combustion engine, and it is probable that another spring will see far greater movements planned and fulfilled than ever before in the history of any one branch of automotives.

The greatest strides from the viewpoint of municipal adoption of the motor bus have undoubtedly been made in the middle and extreme west. California has one of the largest bus systems in existence. Its lines very nearly cover the entire state and are being added to from month to month. This company operates on schedule in the same manner as a railroad and it is estimated that more



Type of Bus That Has Proved a Dividend Earner for New York Operator—Note Unusual Capacity Gained by Upper Deck.

than 6,000,000,000 passengers will have been carried this year. It is highly profitable. Middle western cities are rapidly giving in to the trend of the times and adopting the motor bus, although not without the usual restrictive legislation to combat that accompanies all great progressive movements. In Ohio a mayor has been elected through his pro-bus platform. Throughout the extreme South, summer resorts that had fallen into de-

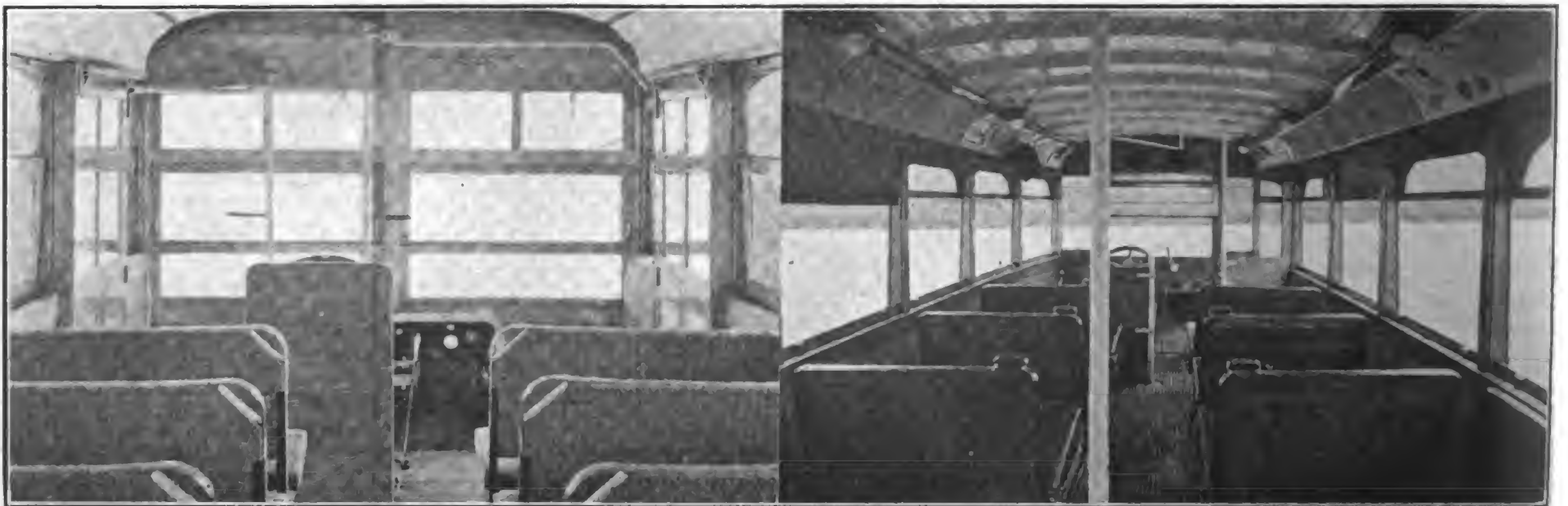
cay are again booming, thanks to the magic of the motor bus, and far-lying roadside communities, deserted years ago by the railroads, are once more coming into touch with the world through the use of the motorized common carrier.

Is Highly Profitable.

According to many prominent thinkers the possibilities of profit in the bus business will within the next few years lay the foundation for fortunes that will compare with those which were the development of the interurban traction lines during the past 20 years.

Motor bus transportation is open to the man with limited capital as well as to the man with millions. From the records of those operators now operating bus lines, the cost of operation is found to be less than one cent a mile per passenger, including all overhead, operating, insurance and sinking fund charges, according to Walter E. Parker, president of the Commerce Truck Co., to whom we

are indebted for the records of a motor bus company, with an investment of \$30,000, which, operating four motor busses on a certain route, is earning 70 per cent. for its stockholders, in addition to providing a sinking fund sufficient to maintain all necessary repairs and replacements and to retire the entire investment in equipment within four years, and it is doing this in a territory already served by electric railroads.



These Interiors Are Illustrative of the Best Practice of Successful Designers—Ample Space Is Provided by This Layout, the Lighting Arrangement Is Superior and Every Comfort of Passenger Has Been Taken Into Consideration.



School Bus Lines Are Rapidly Springing Up Throughout the Entire Country—They Are Popular with Both Teacher and Pupils.

A motor bus seating 20 passengers requires an initial investment of from \$4000 to \$5000, and costs, including all charges specified above, just under 18 cents a mile to operate.

There are many districts in this country where a round-trip route can be easily found where the distance travelled will not exceed 50 miles, and where a bus can easily make three round trips a day, at a cost of \$27; and, if only carrying 60 per cent. capacity, at a charge of 2½ cents a mile per passenger, the daily income will be \$45, showing a profit of \$18 a day.

With these possibilities, capital will be attracted to the business and the stocks

of motor bus companies will become fashionable with investors all over the country. New companies, both small and large, are being formed to take care of the demand for motor bus transportation. Motor truck factories will be busy supplying the demand for motor busses, as the United States is full of far-seeing men who are quick to grasp an opportunity and who will wish to be among those who are the first to ride into fortune on a motor bus.

An Aid to Electric Systems.

The motor bus can be a distinct aid to electric railway systems and is rendering such service in a number of communities,

according to Walter Jackson, consulting engineer, of Mr. Vernon, N. Y.

Where the motor bus relieves congestion at peak traffic periods, if it raises the speed of the street cars only one mile an hour, it is thereby enabling the railway to get 10 per cent. or more work out of its men and rolling stock.

Suburban routes can be served by the motor bus when it would not be worth while for the electric company to build spur lines for light traffic. The companies can operate such busses as feeders to the main rail lines, or can give through bus service at a higher fare.

Motor busses are also sometimes profitable when the question of retrackage has to be considered. The investment needed for the motor vehicles may well be far less than the cost of rebuilding the roads especially when the traffic on the particular line is not especially heavy.

Many an electric line, says Mr. Jackson could do well to operate organized motor bus systems and thereby protect themselves against irresponsible jitney competition.

People demand the best form of transportation and the motor vehicle, whether for merchandise, for bus lines or for individual service, will, on meritorious performance, secure its share of patronage with the proper share going to the railroads, trolleys and water ways. Each has its place and each can be helpful by increasing the efficiency of the nation; for it is admitted that nothing except printing has done so much for civilization as transportation.

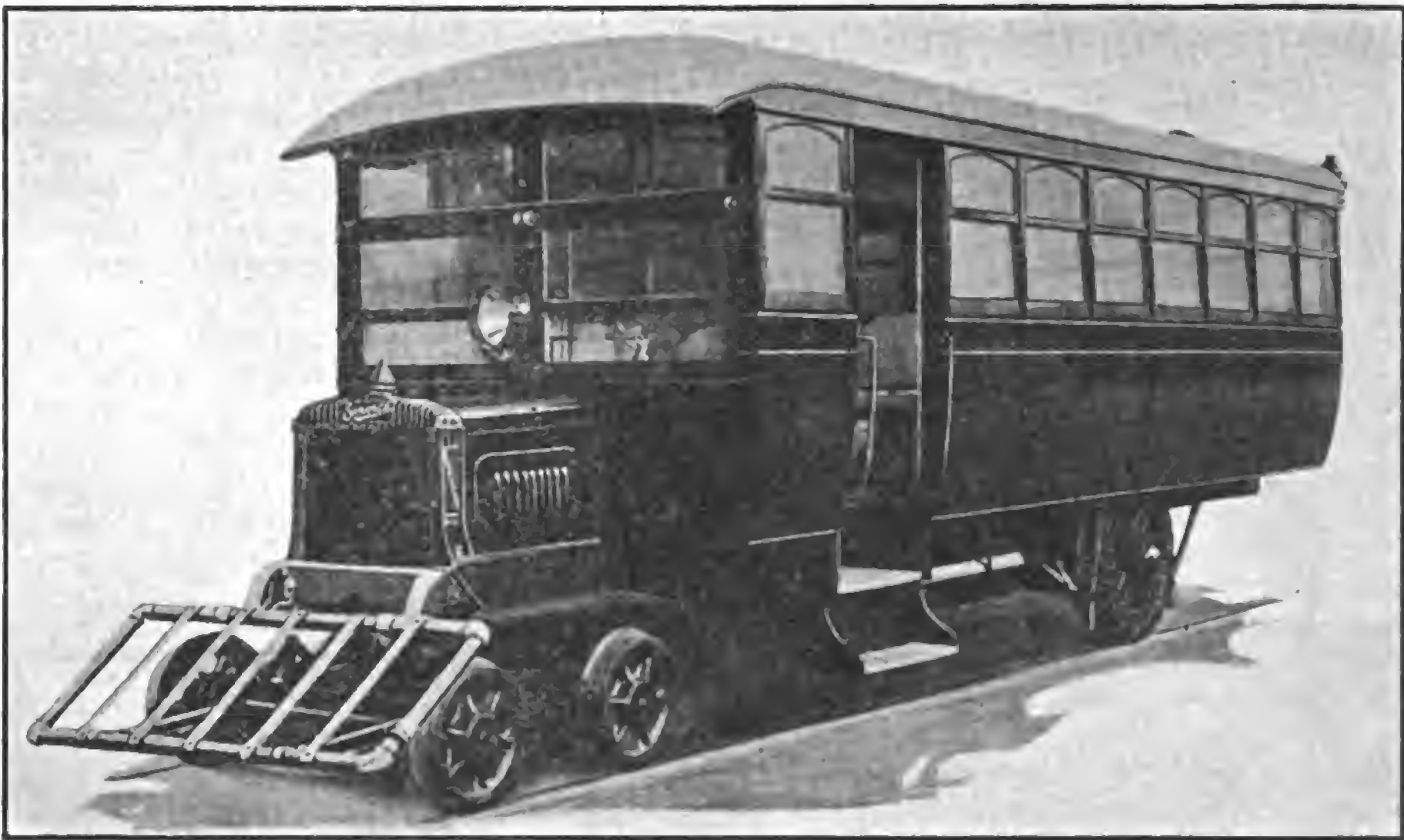
SOUTHERN RAILROAD USES SERVICE BUSES

THE Winchester & Western Railroad Co., Winchester, Va., has installed a passenger service which is unique in that section and may, it is predicted by those competent to judge, revolutionize methods of handling this class of transportation on short-line railroads. The innovation is simply a beautiful new high-class motor car propelled by gasoline.

THE car body is mounted on a five-ton Service truck chassis supplied by Harry W. Ebert, the local agent. The wheels are like those used on the heaviest truck, and the flanged tires are the same as used for the pony wheels of the largest locomotives. The rims are about one inch thick.

The Winchester & Western railroad is nearly completed to Wardensville, W. Va., having reached the big bridge across the Great Cacapon river about one-half mile this side of the Wardensville depot.

The new motor car is running on schedule time and is hauling almost full capacity, making a round trip daily from Intermont to Winchester and return. It arrives here at 9:55 a. m. and leaves at 3 p. m.



Railroads Are Giving Marked Attention to the Motor-Operated Passenger Car, Especially in Short-Haul Service.

W. B. Cornwell, president of the company, says this car will have another attached about the same size in a few days, in the nature of a trailer. This trailer will be a combination car for passengers, express, mail and baggage.

The passengers who are using the new car are most enthusiastic about it. They say they prefer it to a regular passenger coach. There are no smoke, dust or

binders, and but little noise. The indications are that the business will justify the operation of another similar car as soon as the road is completed.

It was learned also that the company contemplates running an excursion from Wardensville to Winchester and return every Wednesday and Saturday evening, affording opportunities to people west of here to spend an evening in town.

DUPLEX MEETS WITH APPROVAL

COUNTRY districts where good roads have been built to some extent, are proving fertile fields for the operation of motor bus routes between important centers. Towns which hitherto have been more or less isolated are thus being made accessible to the larger centers, and their development greatly aided. Regular schedules are followed and up-to-date bus equipment is used, as the country districts demand and expect that their service shall be on a par with the types used in city and suburban sections. Companies which handle this class of service know what is required of the various units to enable them to stand up under the severe work of bus service. Stopping and starting several hundred times a day is especially trying on such members as the clutch, transmission and rear end, and these parts must be made sufficiently simple and strong to withstand this strain, otherwise their life will be short.

TIRE equipment also enters largely into the operating expense and maintenance costs and this must necessarily be adapted to bus service whether operating over the best of roads or those of the type found in country districts.

The Duplex Truck Co., Lansing, Mich., manufacturer of a well known line of motor trucks, is one of the latest to enter the motor bus field with a special 1½-ton chassis especially designed for this class of service.

A fleet of 14 Duplex busses is now being operated in Washington, D. C., by the Washington Rapid Transit Co. Another fleet is running between Elkhart and South Bend, Ind., and other smaller fleets are in service in other parts of the country.

The bus has a seating capacity of 21 passengers besides the driver and is of the pay-as-you-enter type. The interior construction is very similar to the customary type of street car, having the rat-tan-covered cross seats, so arranged as to give greater comfort to passengers.



Passenger Comfort Has Been the First Consideration in the Building of This Bus Which Piles Between Elkhart and South Bend, Ind.

After exhaustive tests with this type of bus the company has determined that they can be operated at an average cost

of 21 cents a mile, including all depreciation, administration and overhead expenses.

BUS FRANCHISE BIDS ARE OPENED BY COUNCIL.

SAGINAW, MICH., Dec. 10.—The local council recently opened the six bids received for supplying street transportation in that city and found that proposals were offered as follows:

The Saginaw Motor Bus association, with 46 busses now in use, would add larger busses as rapidly as business would permit, charging a five-cent fare and issuing transfers costing two cents extra, with school children's fares costing four cents. The company offers to give bonds for \$10,000 for the exclusive right to the streets for five years at no expense to the city.

The Union Motor Truck Co., Bay City, Mich., a \$350,000 corporation, wants to supply \$35,000 in equipment for a 10-year franchise, offering 35 busses with the fare to be determined by the city.

The Nelson Motor Truck Co., Saginaw, Mich., bids to supply 40 busses and to form a \$335,000 company to manage affairs.

The Detroit Motor Truck Co., offers 60 20-passenger busses, five-cent tickets, one-cent transfers or a seven-cent cash fare, the city being called upon to assist in the formation of a \$350,000 company. The company desires a franchise to be determined by the city and guarantees a return of 10 per cent. on the money.

The Trackless Transportation Co., New York City, desires to cooperate with the city in organizing a \$325,000 company, the company to supply half the capital necessary, to provide 35 busses, to charge not less than seven or more than eight-cent fares for a franchise of five and preferably 10 years.

The Wolverine Transit Co., Detroit, is also in the field asking for a five or 10-year franchise, agreeing to provide 30 or more busses, to sell \$125,000 of stock in the city and to charge a six-cent fare.

The Saginaw Bay Railway Co. did not submit a bid. This company operated the street cars up to last August.

NO TROLLEYS IN SAGINAW UNDER NEW REGIME.

SAGINAW, MICH., Dec. 14.—The city council, in regular session, has adopted the proposal of the Wolverine Transit Co. of Detroit to furnish motorized street transportation service in Saginaw.

The Detroit company was the first to come here with a tangible plan after the street cars suspended operations late in August. Commissioner Phoenix voted against the plan.

The company offers to operate 30 or more busses of modern type over the routes heretofore followed by the street cars, with additional routes where necessary. The cars are to be in operation within 90 days after final arrangements are completed. The fare is to be six cents, with universal transfers.

To finance the plan the company proposes that the city arrange to sell advance fares totalling \$125,000 in books of tickets, the board of commerce to assist in the sale.

The money from this source is to be held by a trustee appointed by the city and drawn on for \$4150 by the manufacturers of the busses when each bus is delivered. The trustee is to have a first mortgage on the equipment to the extent of \$125,000 until the company has given transportation totalling that amount.

AN ANNOUNCEMENT.

NEXT month's issue will contain an article, "The Spirit of Transportation," by Ezra W. Clark, of the Clark Equipment Co., Buchanan, Mich. Both a resume and a prediction, this treatise of an all important subject should be read by all who are interested in the development of the motor bus.

MACK BUS IS EFFICIENT UNIT OF TRANSPORTATION

THERE has been a marked evolution in passenger transportation methods during the past few years in which the motor bus has played a conspicuous economic part. The average jitney bus, however, that has been operated upon the public highways, cannot be considered as a satisfactory ex-

of which is to eliminate pneumatic tires because of their high first cost, high renewal cost and the hazard of blowing out when the bus is running. This new spring suspension permits the use of solid cushion tires without in the least impairing the easy riding qualities of the bus. The principle of the new suspension is that the ends of the springs, instead of being attached to the frame by the usual metal spring shackles, are imbedded in large rubber blocks held under pressure



Scenes Like This Are Daily Becoming More Noticeable—This Company Operates a Very Successful Bus Line in an Eastern City.

ponent of the motor bus idea in all respects because of its often time uncomfortable interior, crude body construction, inadequate chassis and high cost of operation and maintenance.

HAVING these facts in mind, the International Motor Co. has developed and marketed a special type of bus in which all glaring defects are claimed to have been eliminated and many important exclusive refinements added. To this end radical changes have been made in the body and chassis design with the result that there is now offered to the public a bus with improved interior appointments and a low hung body, easy of entrance and exit, with all instability and tendency to overturn eliminated. Although the chassis is equipped with solid tires, its riding qualities are stated to be better than those of an ordinary bus equipped with pneumatic tires, and the cost of upkeep is less. These improvements should meet the demands of discriminating passengers for more comfort and safety, and of the bus owner for greater durability and lower maintenance.

Chassis Improvements.

The chassis improvements include a new type of spring suspension, the object

in housings which are in turn attached to the frame. The rear springs are somewhat differently secured from the front springs as they take the driving thrust forward and backward. The ends of

BUS IS POPULAR.

THE Piedmont section of Carolinas is proving a very popular field for the operation of busses. Five lines are at present actively engaged in hauling passengers from the country districts to the city from points within a radius of 45 miles. During each week the passengers coming to the city average around 500, a feature which the merchants appreciate, as it means additional buyers. The fare charged for this service, from distances of 40 miles, is only \$1.50 for the round trip, which is considerably less than that charged by the railroads.

the two upper leaves are held in two metal liners cupped out to fit the rubber block. The shape of the liner is such that there is no slipping of the spring end in the block, but any displacements of the spring, up, down or endwise, is taken up in the rubber block without surface friction and resulting wear. This arrangement allows the use of the Hotchkiss drive as usual. On the front springs no metal liner is necessary as the endwise movement and thrust of the springs are negligible.

Among the advantages of rubber shock insulators are the following:

First, no lubrication is required; second, the up-keep much less, since no grease cups and no grease or oil are required, and no cleansing is necessary; third, the ability to insulate the frame from many shocks ordinarily transmitted from the springs, thus improving the riding qualities of the vehicle; fourth, there is no friction between surfaces, consequently no wear, looseness or rattle; fifth, the rubber tends to compensate for the twisting action between the spring and frame; sixth, the side and end thrust is taken without metal-to-metal contact; seventh, there is a less horizontal motion of the axle, because the springs elongate from the middle toward both ends, this lessening the steering effort and preventing unnecessary brake action; eighth, the tendency to reduce so-called "crystallization" of the frame, steering gear parts and other members due to vibration transmitted by shackles of the older type, the tendency of the nuts and rivets to loosen being decreased; ninth, increase in the life of the tires; 10th, it does away with shackles, spring eyes, bushings, hardened and ground steel shackle pins, grease cups, shackle bolts and nuts; 11th, two or more main leaves of the spring can be made to bear in the rubber, thus giving added strength; 12th, the spring construction is simplified, since no wrapped eye is required, and the cost of assembly and replacement is also less than with spring shackles.

Test runs of 20,000 miles indicate that the rubber blocks will stand up for 25,000 miles without renewal. The eight blocks can be removed by two men in an hour and renewed at a nominal cost. To show visually the comparative riding qualities of the rubber spring block with cushion tires and the usual spring shackles with pneumatic tires, an instrument is used which records graphically the vibrations transmitted to the frame from the wheels. A needle moves up and down over a travelling record, the extent of the movement of the needle being determined by the severity of the shock transmitted to the frame. This record shows that over the same stretches of road the rubber spring blocks not only reduce the severity of the shocks to a marked degree, but also shorten their duration; in short, that during these identical runs over the same stretch of road, the rubber spring blocks rode more smoothly than pneumatic tires. While the object has been to give riding qualities equal to pneumatic tires without the cost of such tires, it will be observed that, as a matter of fact, the riding quality

(Continued on Page 659.)

Haitians Ride Motor Bus Railway

SMALL, speedy street cars run by Dodge Brothers motors are helping to solve the street railway problem of Port Au Prince, the capital of Haiti. Hampered as they are by political troubles and forces of occupation in their treatment of the transportation problem, the Haitians have out-stepped many cities more advantageously situated. Interesting photographs of the novel street cars were brought back by Edward Henkel, who visited Haiti recently on board the United States steamship Henderson.

FOR the period of the last six or eight republics, as they figure time in Haiti, railroads and street cars there have been operated by the Haitian American Sugar Co. For many years large sums of money have been squandered annually in the upkeep of ancient steam locomotives, which consumed fabulous quantities of coal in their short trips.

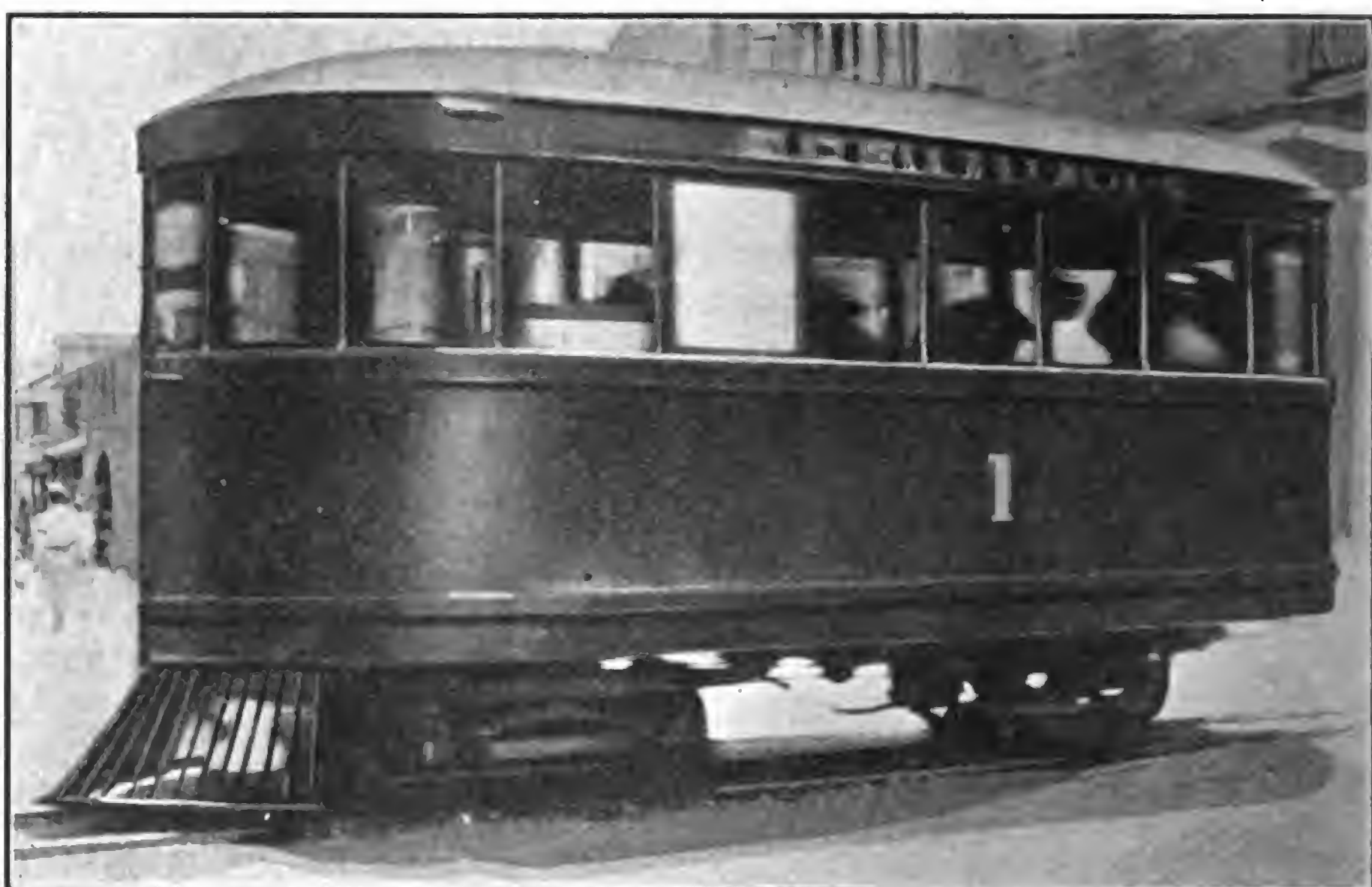
An economical solution was finally reached by the railroad superintendent with the help of Anton Kneer, Dodge Brothers dealer in Port Au Prince. With a Dodge Brothers chassis as a beginning a complete street railway coach was built. The gearing from the original rear axle to the 32-inch locomotive wheels which drive the car was greatly reduced so that the sprockets on driving axle and driving wheels were equal in size. In this way the power which could be applied was greatly increased.

With a total weight of 7250 pounds the chassis could now be sped up to 40 miles an hour without overheating the motor. On this chassis a complete street car was constructed, and the outfit is now making regular trips on the streets of Port Au Prince.

So successful has the venture proven that the Haitian American Sugar Co. contemplates adding three or four more street cars on Dodge Brothers chassis, and similar jobs to haul sugar out of its plantations.

WILL SHOW NEW BUS BODY STYLES.

NEW YORK, Dec. 8.—In conjunction with the National Automobile show, the Automobile Body Builders' association will conduct a motor car and motor bus body exposition in the 12th Regiment armory, Jan. 9-14. Body builders as a group will be visualized strongly, while practical specifications for automobile and truck manufacturers will be shown which will make the work of choosing suitable designs much simpler than heretofore, a feature which makes easier the work of the large body of engineers to



Revolutions Are Trivial Compared with Progress in Port Au Prince, Haiti, Which Has Shown Far More Push Than Lots of Its Northern Neighbors, as Is Evidenced by This Very Modern Method of Transportation.

adopt advanced ideas of body design and construction.

The exhibits will be confined to commercial, bus and passenger car bodies and to the materials used in fabricating them. Bodies of every type will be shown. Some will be finished and trimmed while others will be displayed unfinished, making possible an examination of the framing, metalling and other constructive features. A large number of entries for the show has already been received.

NEW FARE RULING HITS CONNECTICUT OPERATORS.

BRIDGEPORT, CONN., Dec. 8.—Bus owners of this city and surrounding Connecticut towns are hard hit by the new ruling of the State Public Utilities commission in ordering the Connecticut Traction Co. to restore five-cent fares on all city trolley lines, effective for 90 days from the 20th of November. This is reported to have served practically a death blow to former bus owners who had been

hoping that the bars against them would be lowered. Some bus owners who have not been operating for several weeks have gone to other cities in which the orders of the commission are not effective.

DEMANDS FRANCHISE FOR MOTOR BUS.

BEAVERTON, ORE., Dec. 12.—All motor bus trucks in this city are now operated under a franchise, the terms of which are left to the option of the city council, which has the right to grant or refuse it according to the particular conditions. Similar ordinances have been passed at McMinnville, Oregon City, Newberg, Scappoose, West Linn and many other towns throughout the state. Oswego is also putting a similar ordinance into effect.

TOLEDO GETS BIG MOTOR BUS LINE.

TOLEDO, O., Dec. 10.—Bus transportation in this city was recently augmented by the formation of the Toledo Bus Transportation Co., incorporated with a capital of \$100,000 to operate bus lines in Toledo and interurban points, connecting with surrounding cities and towns.

At present 70 busses are operating in the Toledo streets.

NEW SERVICE POPULAR IN SEATTLE.

SEATTLE, WASH., Dec. 10.—Seattle traction interests for many years have been trying to stem the encroachment of passenger car busses, but without great success. Recently the state department of public works granted a certificate of convenience to the Sound Transit Co., to operate busses between the down-town business district and Roosevelt Heights, just outside the city limits. Service was begun by the company on Nov. 24 and has proved very popular.

CITY WANTS BUSSES.

AT A conference of the city departments called recently by Mayor Hylan of New York to consider amendments to the existing laws which will be presented to the next session of the State Legislature, he announced that the city would again ask the Legislature for authority to operate busses. Mayor Hylan stated: "We are prepared to spend \$10,000,000 in the purchase of well-lighted, comfortable and well-ventilated busses."

A Market? Yes: For Some One.

WANTED!

Motor truck manufacturers and dealers to recognize and take advantage of a great opportunity. Here it is:

1. FARM LOAN ACT

ONE BILLION DOLLARS is immediately available for the development of agrarian interests through the passage of an act which specifically provides that this enormous sum is to be spent in part for the marketing of farm produce and livestock.

IS THAT A MARKET?

2. FEDERAL HIGHWAY BILL

APPROXIMATELY \$180,000,000 is added to the incidental money that will be spent on road development during the coming months by this legislation. The total should be far in excess of this amount taking into consideration the work that will be done by cities and towns throughout the country.

IS THAT A MARKET?

OF COURSE this great amount of money is going to be spent on something besides motor trucks, but there is a good chance for the industry to claim at least a part of it. It all depends on the manner in which you tackle the job. You'll admit the opportunity. What are you going to do with it?

Hauls Capacity Loads

**Lombard Tractor-Truck Has Wide Range of Usefulness
—Is Equipped to Use in Snow—Weight Distribution
Makes Possible Passage over Country Bridges.**

A COMBINED tractor and truck of the crawler type has been perfected by the Lombard Auto Tractor-Truck Corporation, Havemeyer building, 26 Cortlandt street, New York City, which, it is claimed, efficiently performs the service of both types of vehicles and does special haulage work that would seem practically impossible to the casual observer.

Isolated ranches, a long distance from railway points, are stated to be heavy users of this machine, as are also lumbering interests in the various parts of the country. For winter service the front wheels are removed, runners fitted instead and the tractor-truck is thus able to operate over snow-covered roads or trails as easily as it does on bare ground with the front wheel equipment.

THE Lombard tractor-truck is provided with a large platform over the crawlers which may be used for carrying freight or, when travelling long distances where it is not always possible to obtain fuel, oil and water, these necessities may be carried on the rear platform in steel or wooden barrels and drawn on as needed.

This machine functions in much the same manner as a steam locomotive running on rails hauls freight cars, the tractor-truck taking the place of the locomotive, while sleds or trailers take the place of the freight cars, and it operates on the ground or snow instead of on rails. Claim is made that heavy tonnages may be hauled in this manner and, as the load is equally distributed between the tractor-truck and the trailers or sleds and with the machine weighing but 9½ tons, that travel over country bridges is possible without causing excessive weight on the bridges that would cause them to collapse.

If desired a steel cab is fitted around the driver's seat and a radiator shield at the front of the radiator, which enables the tractor-truck to operate successfully

in extremely cold sections. Many municipalities have made use of this machine during the winter months for opening snow-clogged roads, the capacity of the machine being such that it can handle a full width plow, which makes it necessary to pass over the road but once, clearing the snow to the full width at one operation over it. Still other municipalities haul a heavy roller behind the tractor-truck which rolls the new fallen snow to a suitable level for horse or auto travel, this being considered a very desirable method of handling the successive heavy snow falls which occur during the winter months. In the lumbering sections the Lombard tractor-truck is used extensively for hauling logs from the woods to the mill or to near-by points on a river where they are piled on the banks, awaiting the opening of the river in the spring when they may be floated down to the mill.

The traction of the crawlers is spread over a large area, and the weight is so evenly distributed that no damage is done to country roads, road commissioners claiming that the highways are in much better condition on account of the

tractor-truck travelling over them, the crawlers acting similarly to a roller, levelling and packing the surface.

The tractor-truck is also used in the lumbering regions for plowing drifted snow paths or trails. Being equipped with runners instead of wheels, it is able to operate in deep snow without difficulty.

Ample Power Furnished by Six-Cylinder Engine.

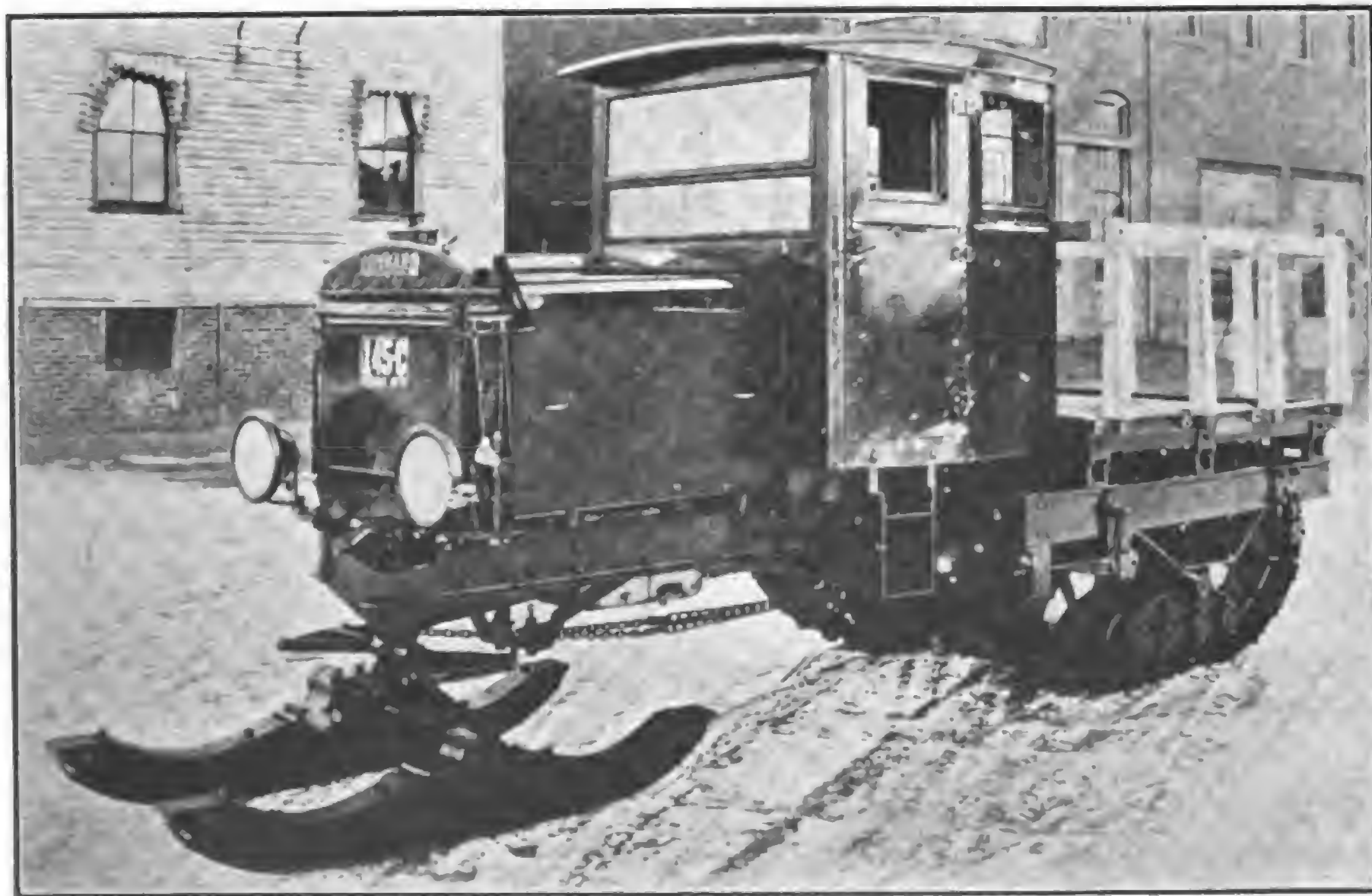
The engine of the Lombard tractor-truck is a powerful six-cylinder, T-head, vertical type engine manufactured expressly for this class of work. The cylinders are cast in pairs, and are of the finest close-grained gray iron. Water is circulated by centrifugal water pump through a special radiator located in the conventional position. The cooling system has a large capacity which, together with the large four-bladed fan, cools the engine sufficiently under all conditions of use.

The statement is made that the engine develops a maximum horsepower of 140 and that all its parts are readily accessible for repair work or overhauling and that each unit is thoroughly protected from dust and dirt. Photographs are shown which demonstrate the ability of the machine to negotiate soft travelling, steep grade work and other lines which show its general adaptability for all-around service such as is found in unimproved sections of the country.

The crawler treads do not require lubrication, being made in such a manner that they operate successfully without it, the statement also being made that the tread cannot become clogged with sticky mud, and that they may be furnished of a character suited for use on any class of road or pavement.

The change from wheels to runners is easily made in a few hours time, enabling the tractor-truck to be used on snow as well as on bare ground. With wheel equipment, soft ground is easily negotiated as a small percentage of the total weight of the machine is carried on the front wheels and they do not sink in as do those of other vehicles carrying more weight in front.

Sufficient fuel and oil can be carried on the rear platform for 400-mile runs.



Runners Are Easily Attached to the Front Axle of the Lombard Tractor-Truck. This Is Especially Desirable for Use Over Country Roads.

Invents Cotton Picker

Kentuckian Perfects Apparatus for Which Much Is Claimed—Rights to Manufacture Have Been Sub-Let to a Number of Tractor Builders.

SOUTHERN cotton planters are evincing great interest in a cotton picking machine invented by Carroll Stuk-enbrog of Kentucky and placed on the market by the Cotton Picker Co. of America, Chicago, Ill. The rights to manufacture and sell this machine have recently been sub-let to a number of tractor manufacturers, among which is the Indiana Silo & Tractor Co., Anderson, Ind. To adapt the cotton picking machine to tractor use, several improvements were necessary and since these have been made the efficiency of the equipment is materially increased. Electric motors driven through flexible shafting to the picker heads with the motors fastened to the suction tubes a short distance from the ends, are among the improvements noted, while separate motors are also fitted to each of the suction pumps located at each corner of the picker frame.

POWER is evidently obtained from a generator directly connected to the transmission of the tractor, which supplies the needed current to operate the motors. Bags are provided under each pump to collect the cotton sucked in from the picker heads.

The advantages of this method are obvious, as the cotton is picked by brushes in the picker heads, which revolve at 2500 revolutions a minute, drawing the cotton from the stem of the plant without damage, while the suction exerted by the pumps has a tendency to dry the cotton as it passes through the tubes to the collection bags. The statement is made that the moist cotton is dried slightly while passing through the tubes and that light trash and foreign matter are blown out of the cotton fiber before reaching the collection bags.

In recent tests given this machine near Little Rock, Ark., it was demonstrated that it was able to gather the cotton cleaner than by hand and that the product was delivered in a better shape as it is picked up lightly, the fiber is not broken and but little trash is taken in, and this is blown out on the way to the collection bags.

Mr. Cottrell, the agriculturalist of the

Cotton Picker Co., states that there are large benefits to be derived by the South from an efficient cotton picking machine. It now requires four or five times the number of men to pick a crop of cotton than it takes to raise it. With the picker, the same force that raised the crop can also harvest it. Then, too, with the cotton picker, all of the crop can be picked when it is ripe, and planters agree that the first third of their yield brings as much as the latter two-thirds, because the last of the crop is ordinarily damaged by storms before it can be picked. The picker will gather from three to five times as much cotton as can be picked by hand, and a woman or child can operate it.

The statement is made—that this cotton picking equipment can be attached to any tractor, truck or automobile, or, in other words, any power machinery of this character, that is suitable for farm use.

It is stated that the machine is to be placed in production early in 1922 and it is expected that a heavy demand will be received from the cotton-growing states. The present machine is equipped with four heads, but it is planned to place a smaller machine in the market early

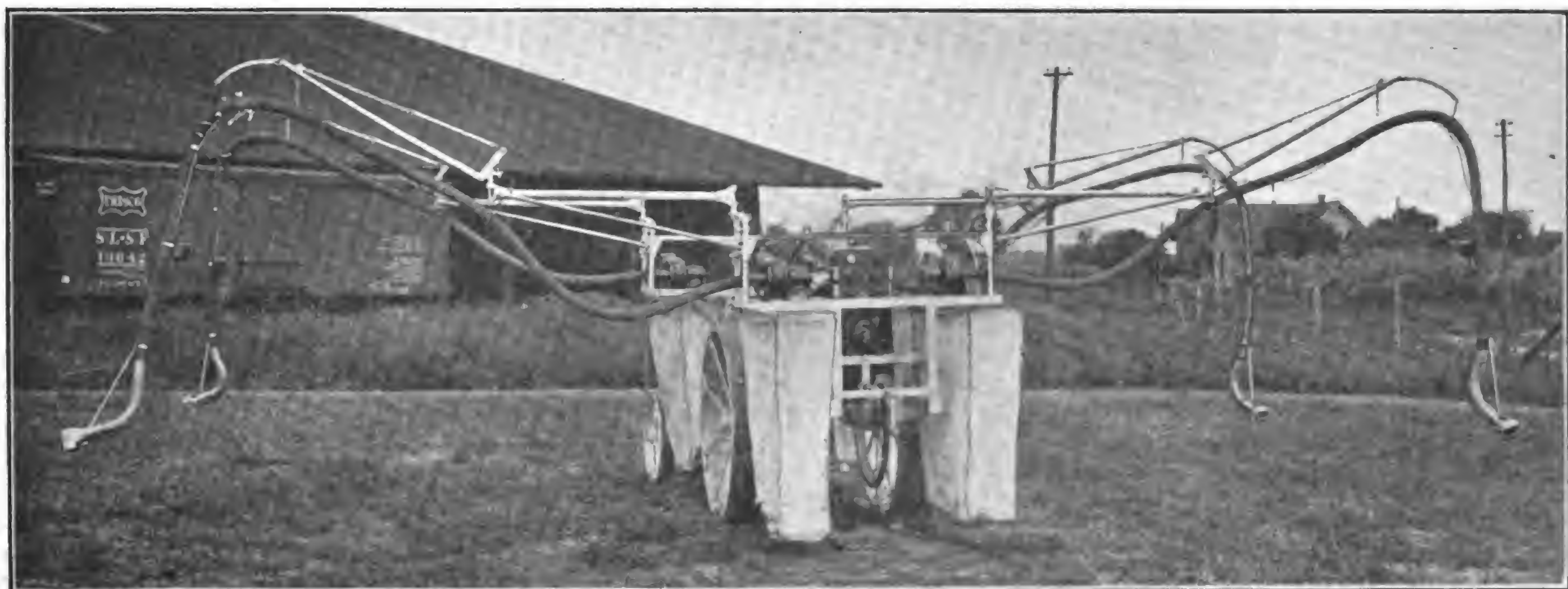
next year equipped with two heads which, it is estimated, will cost about \$400.

The contemplated plans, in connection with motor trucks as power, include a device which will bale the cotton when a sufficient quantity has been picked, thus preparing it immediately on the truck for shipment to the cotton gin. It can be readily seen that this method, when perfected, will save time and labor in baling the cotton over the present methods.

FARM PRICES IMPROVING.

At a public sale held recently on a farm near Dyer, Ind., there were good indications that farm prices are climbing back to their old places.

Seed oats sold 13 cents higher than the elevator price; standing corn in the field went as high as \$24.50 an acre. Nineteen head of cattle averaged over \$100 each, and one cow brought \$195. Horse prices, which were exceptionally low, were the only disappointing feature, indicating the great effect the use of tractors and other automotive machinery has had upon the horse market in this part of the country, a condition that is becoming universal.



This Unusual Machine, Which Will Be Marketed Early in 1921, Should Do Much to Expedite Cotton Picking—It Attaches to Any Automotive Vehicle.

Speeding Up Silo Filling

Machine Developed by Implement Builder Can Be Used with Motor Truck to Save Time on Important Job.

(By B. E. SKINNER, Advertising Department, Emerson-Brantingham Implement Co.)

"MY CORN was in the silo within 20 minutes after being cut. It was fresh, free from dirt, and in the finest possible condition to make silage of the highest feeding value," said J. W. Rankin, Rockford, Ill., after using a simple new machine, the corn binder wagon loader, in filling his silos this fall. That's putting speed into one of the slowest jobs on the farm. It places the old method of hand loading in the discard along with the crooked stick and the cradle. The wagon loader is an attachment for the corn binder developed recently to perform the hard hand work of loading corn on to wagons after it has been cut and bound.

AS SHOWN in the illustration, it consists of an endless apron elevator mounted on the rear of the corn binder and driven from the binder counter shaft by means of shafts and universal joints. A caster wheel and frame work support the loader so that it readily follows the binder without making it unwieldy. The mechanism is controlled by the in and out movement of the gear lever of the binder.

In field operation the binder is driven down the rows of corn as usual, but with a rack driven alongside under the end of the loader. As the bundles are bound

they fall on to the wagon loader, which elevates them to the wagon. When the wagon is loaded it is driven to the ensilage cutter and another takes its place.

Under this new method it is easily possible to have corn in the silo within 20 minutes after being cut, a remarkable saving of time and labor over old methods. Practically all hand work is eliminated. The corn does not come in contact with the ground where it accumulates dirt and is trampled upon. And best of all, it is packed into the silo in the best possible condition. With these advantages the wagon loader promises to revolutionize silo filling in the future.

Give Good Service.

Several of these new machines have given excellent service this season. As the following interview with Mr. Rankin of Pinehurst farms will show the wagon loader has gained instant favor wherever it has been used. "As you will doubtless remember," he said, "there wasn't a continuous 48 hours without rain from Sept. 12 to Sept. 24. Our corn was ready to put into the silo just at that time and we went to work with one tractor on the corn binder and wagon loader and another on the ensilage cutter. We used teams to haul the corn from the binder to the cutter. During the time we were at work filling our large silo, holding 220 tons, we could not work longer than three-quarters of a day at a time, because of the weather. Either the ground was too muddy for us to get into the field, or else it was raining so that the belt would not hold on the ensilage cutter. Yet, drawn out as the operation was, every load of corn that was ensiled was in prime condition. Every load put into the silo was green, clean and fresh,

for within 20 minutes after being cut it was packed away in the silo. The absence of grit was clearly indicated by the fact that the cutter knives were sharpened only twice for the 220 tons of silage, and they were not run dull at any time."

Low Ensilage Cost.

Mr. Rankin's figures on the expense of filling his 220-ton silo were as follows:

320 horse hours at 10 cents.....	\$32.00
470 man hours at 40 cents.....	188.00
76 gals. kerosene at 10 cents....	7.60
30 gals. gasoline at 20 cents.....	6.00
5 1/2 gals. oil at 80 cents.....	4.40
Total.....	\$237.90

Adding to this the cost of twine and a few minor repairs, the expense of putting the crop into the silo was \$1.14 a ton.

"The experience of this silo filling season has brought home to me, in a way that I had not realized before," continued Mr. Rankin, "the importance of the wagon loader in connection with the filling of a silo. I don't know whether the wagon loader makes the operation any cheaper than handling the crop the old way, but it certainly is no more expensive. The important point is that the wagon loader keeps the corn clean and speeds up the operation so that the corn is ensiled in the very best condition. It doesn't have a chance to wilt and wagons and teams can't trample on it, nor can it accumulate dirt from the ground.

Neighbor Wastes Crop.

"In contrast to my experience, compare that of one of my neighbors: He began cutting on Sept. 12, just as I did, but without a wagon loader. Today, 13 days later, less than 50 tons are in his silo and the balance lies on the ground being filled with mud, much of it partly buried in mud that has washed down the rows. Before it reaches the silo all of it will be badly rotted and its feeding value practically gone. For feeding dairy cows I certainly would not trade one ton of our silage for three of his. If he had had a wagon loader his silage would have been as good as ours. Even under conditions favorable for hand loading, corn must be cut from one to three days before it is ensiled and every bundle contains a certain amount of dirt and grit. I think a loader would pay for itself in better silage even in a favorable season, and in unfavorable weather, such as we've had this year, it would pay for itself five or six times over."

Pinehurst farms, of which Mr. Rankin is superintendent, are well known for their Berkshire hogs and dairy cattle. Mr. Rankin is a firm believer in power farming and uses modern equipment and methods throughout his business.



Users Indorse Emerson-Brantingham Implement Co.'s Loader—Illustration Shows Method by Which Machine Works—Important Feature Is That Corn Is Off Ground.

Added Impetus Given to Highway Construction by Convention

Many Prominent Men Named for Official Board Positions at Annual Meeting and "Get-Together" Dinner of American Road Builders' Association.

NEW YORK, Dec. 12.—The annual meeting and "get-together" dinner of the American Road Builders' association was recently held at the Automobile Club of America, New York City. Following the session of the board of directors at 3 p. m., the annual meeting of the members of the association was held, at which the reports of the officers and committees were received. Officers for the ensuing year were elected as follows:

President, H. L. Bowlby, chief of the War Materials division, United States Bureau of Public Roads; vice presidents, Charles J. Bennett, state highway commissioner of Connecticut, New Haven, Conn.; Frank Page, chairman, North Carolina State Highway commission, Raleigh, N. C.; A. R. Hirst, state highway engineer of Wisconsin, Madison, Wis.; W. W. Crosby, National Park Service, Estes Park, Col.; secretary, E. L. Powers, editor, "Good Roads," New York, N. Y.; treasurer, Senator James H. MacDonald, former state highway commissioner of Connecticut, New Haven, Conn.

Board of directors: A. W. Dean, chief engineer, Division of Highways, Massachusetts Department of Public Works, Boston, Mass.; H. E. Breed, consulting highway engineer, New York City; A. H. Blanchard, professor of Highway Engineering, University of Michigan, Ann Arbor, Mich.; G. P. Coleman, state highway commissioner of Virginia, Richmond, Va.; M. J. Faherty, president, Board of Locomotive Improvements, Chicago, Ill.; S. E. Bratt, former state superintendent of highways of Illinois, DeKalb, Ill.; Fred E. Ellis, Peabody, Mass.; R. A. Meeker, right of way engineer, New Jersey State Highway department, Trenton, N. J.; F. F. Rogers, state highway commissioner of Michigan, Lansing, Mich.; Fred W. Sarr, first deputy state highway commissioner of New York, Albany, N. Y.; George W. Tillson, consulting engineer, La Grange, Ill.; W. D. Uhler, chief engineer, Pennsylvania State Highway department, Harrisburg, Pa.; J. H. Cranford, Washington, D. C.; Austin B. Fletcher, state highway engineer of California, Sacramento, Cal.; W. A. McLean, deputy minister of highways of the Province of Ontario, Toronto, Canada; I. W. Patterson, chief engineer, State Board of Public Roads of Rhode Island, Providence, R. I.; W. R. Smith, Meriden, Conn.; W. G. Sucro, Baltimore, Md.; John Swan, Pittsburgh, Pa.; H. K. Bishop, general inspector, United States Bureau of Public Roads, Washington, D. C.; M. F. Bramley, Cleveland, O.; F. E. Everett, state highway commissioner of New Hampshire, Concord, N. H.; Samuel Hill, president, Washington State Good Roads association, Seattle, Wash.; J. Frank Smith, manager,

Greater Good Roads association of Kansas City, Kansas City, Mo.; C. M. Upham, chief engineer, Delaware State Highway department, and acting chief engineer North Carolina State Highway commission, Raleigh, N. C.; T. J. Wasser, state highway engineer of New Jersey, Trenton, N. J.

DISCUSS TRACTOR.

THE Society of Automobile Engineers will hold its annual tractor meeting, in conjunction with the National Tractor show in Minneapolis, Minn., Feb. 8 and 9. Two technical sessions will be devoted to tractor subjects, these being held during the afternoons of the two days noted. On Thursday evening, Feb. 9, the annual farm power dinner will be served.

Several amendments to the constitution and by-laws of the association were approved, the most important being a change in the date of the annual meeting from November to May and a revision in the method of electing officers. Under the new provisions the officers will be elected from among the directors by the directors. Vacancies on the board will

be filled each year by a nominating committee of seven selected from the board of directors. Another change makes the president eligible for re-election. By holding the annual meeting in May the new officers will have a longer time in which to lay plans for the annual convention and exposition. Arrangements were made to hold the next good roads congress and show at the Coliseum in Chicago, Jan. 17 to 20, 1922.

Following the dinner the new president, H. L. Bowlby, discussed the future of the association and outlined plans to make the organization of greater importance and influence in the road-building industry.

Colonel J. W. Howard, consulting engineer, New York City, gave a reminiscent talk upon the early paving work in New York City, stating that Wall street was paved in 1890 in response to a demand for the elimination of the noise arising from horse-drawn traffic.

Samuel Hill, president of the Washington State Good Roads association, discussed the progress of highway development in this country. "The time has come for the United States to make a new departure," he said. "There are three forms of transportation in this country, railroads, highways and water ways. Unless we coordinate these three systems into one big system of transportation, each is more or less an economic loss."

George S. Bartlett of the Universal Portland Cement Co., Chicago, Ill., urged the members of the association to go to Chicago to attend the annual convention and exposition to be held Jan. 17 to 20 in that city, stating that Chicago would endeavor to do itself proud in the way of hospitality.

MOTOR KILLINGS.

WASHINGTON, D. C., Dec. 16.—Figures just compiled show that the death rate from motor vehicle accidents last year was highest in California, amounting to 21.1 per cent. for each 100,000 population. Worse than war these figures.



United States Model H Truck Equipped with Steel Flange Wheels and Trailer Operated on a Wood Track in Lumber Camps of Alabama.

Balanced Inventories Slogan for Automotive Industry

Manufacturers Tell of Paramount Lessons Learned by Last Year's Experience—Scientific Study of Costs and Sound Merchandising Also Stressed—No More "Rainbow-Chasing."

NEW YORK, Dec. 12.—What is the paramount lesson learned by the automotive industry in 1921? This question was put to its 400 affiliated manufacturing concerns by the Motor and Accessory Manufacturers' association. A summary of the replies has just been made public by M. L. Heminway, general manager of the association. The overwhelming majority of the responses indicate that the chief fundamental lesson learned by the automotive companies during 1921 was the necessity of maintaining conservative, balanced inventories. Corollaries of this mentioned by most of the companies are the danger of over-expansion and over-optimism; the menace of "over" over-head; the necessity for rigid, but sound economies; and the elimination of "rainbow-chasing."

General conservatism in buying, greater prudence in making commitments and closer period buying are mentioned by virtually all the executives who contributed to the symposium as last year's principal contribution to business wisdom. Another significant recurrent note in most of the statements is the lesson learned by manufacturers that the view point of the ultimate consumer must to a greater extent guide production and distribution policies.

The replies are replete with phrases such as these: "Order more conservatively—respect contracts;" "Quality workmanship at fair prices;" "Keep your house in order;" "Greater efficiency—lower price;" "Study costs."

The experience of the automotive industry last year, in the opinion of a lead-

ing automobile engine manufacturer whose statement is typical of the rest, will be "enormously beneficial in guiding the future policies of the industry. It has taught everyone the need for closer period buying."

One of the largest axle manufacturers

CARS AID SALES.

FRED P. MANN, president of the North Dakota Retail Merchants' association, gives automobiles the credit when he writes to the "Country Gentleman" that his store in Devil's Lake, N. D., sold \$650,000 worth of goods last year. "Eighty-five per cent. of our trade is with farmers. Many of them drive regularly 20 to 30 miles to trade with us and several hundred of our best customers live over 50 miles away."

in the United States sums up the lessons of 1921 thus: "The paramount thing taught by last year's experience is that the saturation point has been switched from manufacturers' production to used cars, and that, until those now in the hands of the dealers can be disposed of, there should be a decided contraction in

the new product."

Throughout the statements there is manifest a candid attitude which lends additional value to the analysis of conditions thus presented. There is a readiness to admit past errors of judgment and blunders of commission and omission, and a firm, vigorous readiness to correct these mistakes constructively by facing the 1922 problems aggressively but sanely. This is expressed as follows by a representative unit manufacturer: "We must pay attention to fundamental principles in manufacture and in business. Our inventories must be kept within reasonable bounds; we should not sign contracts more or less blindly, and in short, we should conform to the laws of sane business which, for some reason or other, we seemed to have forgotten during the preceding few years."

"We have learned, also, of the evils of 'over' over-head; we have learned how to economize in our shops; we are thrifty, whereas always in the past we have been reckless; and we are thinking more of what the public or our customers want, rather than what we feel they should use."

Other questions, relating to the outlook for 1922, the significant new developments which will feature the coming automobile shows, technical improvements in the industry, and the leading current problems of the trade, were also asked in the association's questionnaire. The answers to these additional questions will be made public in a supplemental survey.

YELLOW CAB PRICES.

CHICAGO, ILL., Dec. 12.—The Yellow Cab Manufacturing Co. has announced a radical change in the price of its taxicabs, effective Jan. 1, 1922. The net reduction is from \$2600 to \$2200, for large fleet orders. Prices on extra equipment have also been reduced and in a number of cases extras which have heretofore been charged for are now furnished as standard equipment.

(Continued on Next Page.)



Trailers Are Growing in Popularity and There Will Always Be a Demand for Them as They Increase Profits—The Illustration Shows a Wichita Tractor Hauling Trailer Train.

Automobiles Kill 54 in Columbus

**Ohio Automotive Trade Association
Wants Laws That Will Lower
the High Death Rate.**

COLUMBUS, O., Dec. 14.—The "Slaughter of the Innocents" by reckless drivers in Ohio has mounted to such grave proportions that public sentiment in favor of licensing all operators of motor vehicles has become almost a demand that the Legislature take steps at its next session to end this glaring menace to life and property.

Fifty-four deaths from auto accidents have occurred in Columbus alone during the present year, arousing thoughtful citizens to the great need of a law that will require every applicant for an operator's license to show by examination his or her fitness to operate a motor vehicle, together with a knowledge of the rules of the road.

During the 18 months that the United States was at war 91,000 people were slain by motor vehicles in this country, almost twice the toll of life among the American forces overseas.

The states of Massachusetts, New York, Connecticut, Michigan, Indiana, Illinois, Pennsylvania, Maryland, Delaware, New Jersey and California now have laws in force for licensing autoists. In Pennsylvania at the present time 132 drivers are under suspension while 240 more are being investigated.

"Anything we may do toward regulating traffic must not be half-way—putting entire emphasis on just one phase, such as speeding or road destruction," said Elber J. Shover, secretary of the Ohio Automotive Trade association. "We need an intelligent, constructive transportation code that will fully protect life and property both on and along the highway."

OPEN NEW HIGHWAY.

CLEVELAND, O., Dec. 12.—The Automobile club of Cleveland, O., states that road conditions between Cleveland and Columbus are in fine condition for travel and that a new road is now in use between the two cities.

This new route has been laid out with the cooperation of the state highway department and follows the road heretofore generally travelled as far as Norwalk. From this point the new route passes through the North Fairfield, Delphi, New Haven, Plymouth, Shelby, Vernon, Crestline, Gallon, Mount Gilead, Cardington, Ashley, Leonardsburg, Delaware and Worthington.

Following are the latest recommenda-

TO OPEN AGENCY.

JOHN W. QUEEN, co-partner in the John Buchanan Advertising Agency and former service man in charge of the eastern office of the Automobile Journal Publishing Co., will operate an advertising agency under his own name, after Jan. 1, 1922, at Park square, Boston. Mr. Queen is well known in the advertising field, having handled many large accounts during the several years he has been connected with the industry. He is a keen student of economic conditions, an expert judge of markets and has planned and conducted many extensive campaigns for prominent manufacturers.

tions of the Cleveland club relative to highway travel out of the Fifth City:

Akron—There are two good routes, one by way of Brecksville and the other through Northfield. The latter route is the more direct.

Canton—From Akron straight south-eastward on Market street into North Springfield, Uniontown and Greentown to Canton.

Wooster—From Canton westward on Tuscarawas street, following Lincoln highway through Massillon. In dry weather the route through Medina, Seville and Creston is in fair shape and 30 miles shorter.

Toledo—The lower route through Elyria, Oberlin, Kipton, Wakeman, Norwalk, Belleville, Clyde, Fremont, Hessville and

(Continued on Next Page.)

Pioneer in Industry Takes Big Job

**Brewster Elected Vice President of
Express Spark Plug Co.
Forms Jobber Policy.**

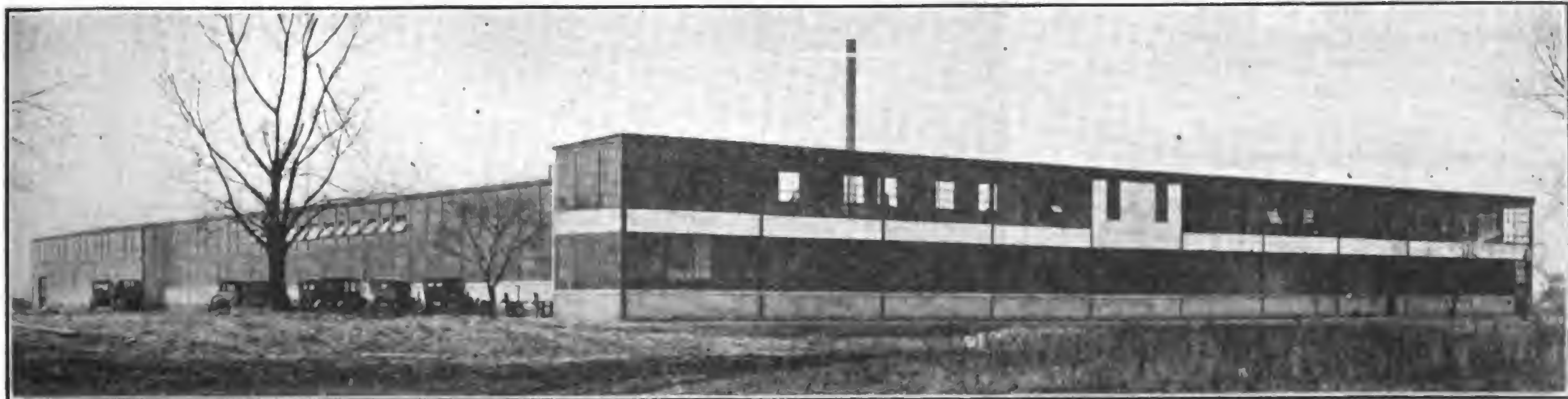
ALEXANDRIA, VA., Dec. 15.—Clyde P. Brewster, active in the automotive industry from its early days, has been elected vice president and general manager of the Express Spark Plug Co. of Alexandria, Va.

Starting in 1905 as branch manager of the Jones Speedometer Co. of Chicago, Mr. Brewster became Philadelphia branch manager of the Stewart-Warner Speedometer Corporation in 1911. Four years later he joined the Edward A. Cassidy Co., Inc., of New York, as district representative, soon being appointed Detroit branch manager. He left the Cassidy organization to go into war work, and after the armistice became associated with the Lyons Storage Battery Co., Philadelphia, of which he became sales manager in 1920.

(Continued from Preceding Page)

The reduction is stated to be due to increased volume of business and facilities for producing more cabs. The change in price comes, according to P. H. Geyser, general manager, despite the fact that the Yellow Cab factory is running to full capacity and orders are now booked for production until spring.

During the past year the company has expended large sums of money to produce the best taxi-cab it has ever built. Numerous expensive improvements have been made, according to Mr. Geyser. He calls attention particularly to the special Timken rear axle designed exclusively for Yellow cabs by the Timken-Detroit Axle Co., and a special taxicab motor being produced for Yellow cabs by the Continental Motors Corporation. "In addition to these two main unit advancements," Mr. Geyser says, "we have made many other improvements in Yellow cabs all at great expense to us, but improvements that make the Yellow cab a better cab and save operating and maintenance expense for the owner."



Factory of Hinkley Motors, Inc., at Ecorse, Mich., Suburb—This Building Comprises 100,000 Square Feet and Has Been Equipped Especially for Production of Hinkley Heavy-Duty Automotive Engines.

Positively Limit Loads to 25,000 Pounds

Connecticut Solons Have Also Determined Load Per Inch of Tire to Be 800 Pounds.

HARTFORD, CONN., Dec. 11.—Taking into consideration the features of safety and road wear, the State of Connecticut recently decided that it would absolutely refuse further permission to truck owners who wish to drive their vehicles with loads exceeding 25,000 pounds.

It was also determined that the load per inch width of tire should not exceed 800 pounds.

This is considered as definite and a final provision of the state law and the policy of the highway department is that, except under certain conditions, there will not be any allowance granted in connection with these provisions.

Complementary to these provisions, truck makers who may certify that their trucks are properly designed to carry more than their rated load—the load on which the trucks are taxed by the state—will be permitted to let their customers so register the trucks of these makers, but at the higher fee which goes with the high capacities.

"The whole proposition takes into account the subject of over-loading from two standpoints," Motor Vehicle Commissioner Stoeckel pointed out. "One is the wear on the roads and the other is the safety factor of the vehicle concerned."

NEW ALEMITE FACTORY.

BELLEVILLE, ONT., Dec. 15.—The Alemite Products Co., Ltd., will shortly begin the manufacture of Alemite products here for the Canadian trade. This company is a subsidiary of the Bassick Manufacturing Co., which successfully pioneered the Alemite system of lubrication. The decision to establish the Canadian subsidiary was forced by the strong demand in the Dominion for Alemite and other Bassick products.

The Belleville organization will start the manufacture of the Alemite lubrication system, the Gas-Co-Lator and perhaps one or two other products at once. Within a short time every item of the Bassick line will be manufactured in Canada for the Canadian trade.

W. E. Rowsome is general manager of the Belleville plant.

(Continued from Preceding Page.)

Elmore is open. There is a detour of 2.9 miles at Monroeville in fair condition; 1.3 miles of this is earth and 1.6 miles macadam. The new route from Fremont through Woodville and Stony Ridge is open, but eight miles longer. On the shore route the bridge over the Vermilion river is closed.

Youngstown—The Solon-Aurora route is excellent to Kent, to Ravenna. From Ravenna to Youngstown the road through Edinburg, Milton Dam and Jackson Center is excellent.

Pittsburgh—Follow the above routing to Youngstown, thence to New Bedford

and into New Castle on new concrete road. Thence south through Mahoningtown into Beaver Falls, continuing along the river through Rochester. Short detour between Beaver Falls and Pittsburgh will give little inconvenience.

Alliance—Follow the Youngstown route to Ravenna, thence southward on Chestnut street to Randolph, eastward to Atwater and southward through Limaville.

Buffalo—Excellent pavement the entire distance between Erie and Cleveland. From Erie to Buffalo follow improved road to Northeast. Short detour at Northeast goes mile north, two miles east and mile south to the main road. Good dirt road from state line into Ripley. Then turn mile north, mile east and mile south to the main road, which from here is improved to the edge of Fredonia. A short detour to the left in Fredonia gains the main

HARVESTER RESUMES.

PLANT Superintendent Charles Smart has announced that the Springfield works of the International Harvester Co. will resume practically normal operation within a very short time and that about 700 men will be given employment. Increased orders from dealers warrant this action, according to Mr. Smart.

road running north to Dunkirk. From Dunkirk to Buffalo the road is in fair to good condition. Detours at Northeast and Ripley are not good when wet.

Chardon—Euclid avenue to University circle, up Cedar hill to Euclid boulevard, thence to Mayfield road, leading to Gates Mill. Continue through Scotland, Chesterland and Fowlers Mills into Chardon.

Chagrin Falls—Euclid avenue to Circle. Up Cedar hill to Fairmount boulevard, thence to Warrensville Center road to Kinsman road, turning left on Kinsman road past Highland Park golf grounds. Continue to South Kinsman, there turning right and following pavement into Chagrin Falls.

Medina—Straight southward on West 25th street. Continue south on Wooster pike, leading direct into Medina. There is a short detour on entering Medina.

Plans Legal Fight on All Infringements

Significant Developments in Protex Signal Patent Suits Seen in Recent Court Decision.

CLEVELAND, O., Dec. 12.—It is stated that the Court of Common Pleas has announced its refusal to sustain a demurrer filed by the American Signal Co., the manufacturer of the Simmons signal, in the patent suits started by the Protex Signal Co. against the many alleged infringers of its patented rear-end signal device. The claims upon which the suits are based are known as patent No. 58,916, covering the design of the Protex lens, and patent No. 1,386,412, covering the assembly and design of the rear end of the lamp. Additional patents on other features are pending.

Oscar Kroehle, president of the Protex Signal Co., claims that the large number of infringements against the Protex signal are peculiarly due to his three years of effort to perfect and simplify the device. When finally offered to the public the Protex appeared so easy to manufacture and the public were so anxious to buy a signal of this kind, that unscrupulous manufacturers are said to have undertaken to cash in on Mr. Kroehle's effort and the public demand.

The Protex is claimed to be the first stop signal built to operate automatically with the foot brake. "The lens," says Mr. Kroehle, "is the most important feature. To make a stop signal effective 24 hours out of every day it is necessary to make it flash with equal brilliancy, day and night, in rain or fog. The Protex has accomplished this difficult achievement. Its unique, transparent, ruby lens construction, lens manufacturers state, is a remarkable accomplishment which cannot be duplicated without infringement. We are, therefore, particularly jealous of our lens patents," continues Mr. Kroehle.



We Should Be Interested to Know If There Is Any Field That Is Not Served by the Efficient Motor Truck.

Roy D. Chapin Calls Townsend Bill "a Forward Step"

Concentration of Federal Funds, Rigid Maintenance Provisions and Other Changes Commended as Advance in Administration and Construction Practise.

NEW YORK, Dec. 14.—The day when the federal government will take over the main interstate highways of the nation, was brought measurably closer by the recent enactment of the Townsend highway bill, in the opinion of Roy D. Chapin, chairman of the Highways committee of the National Automobile Chamber of Commerce. "While the new highway act is not all that students of the question would like to see," said Mr. Chapin, "the law as it now stands marks a distinct step forward in the evolution of our highway policy. Under its provisions, federal aid can no longer be scattered broadcast. Each state highway department is now compelled to designate seven per cent. of the mileage in the state as a system and, of this seven per cent., three-sevenths must consist of primary highways of interstate importance on which 60 per cent. of all federal funds may be concentrated. In those states where highway work is more advanced and where the state highway departments desire to concentrate more than 60 per cent. of their funds on the primary interstate roads, they are permitted to do so, a clause which will enable some 16 states to pursue the policy already adopted of building the most important roads first.

Will Stimulate Main Highways.

"The immediate effect of this act will be to stimulate the construction and maintenance of the trunk highways in those states which, because of lack of funds, have not thus far made much progress toward an adequate system of connected highways. As this progress is made, the states themselves will undoubt-

edly come to the conviction already expressed by officials in the more advanced commonwealths, that interstate highways perform more than a state purpose, are the most useful to the most people and logically should be constructed and main-

TRAVEL INCREASES.

THE increase in automobiles is an index of the growing demand for transportation rather than a sign of withdrawal of business from rail lines, according to Philip H. Warren of Stone & Webster, speaking before a convention of investment bankers. Riding in street railway cars is much heavier per capita today than it was five years ago and very much heavier than 15 years ago, indicating that the demand for all kinds of travel facilities is increasing.

tained by the national government. Presumably, this work would always be carried on through existing agencies of construction rather than through the organization of a federal agency, and the consequent release of state and county funds for the construction and maintenance of the state and county roads would greatly

expedite the completion of a net work of highways everywhere."

"With the recognition of interstate roads now a fundamental principle in the national highway law, there are numerous other scarcely less important changes to be found in the new act. The new requirements for maintenance are so exacting as to insure the nation against loss and to set a high standard for the states. The same is true in the clause which provides that highways must be constructed with due regard for future as well as prevailing traffic needs. The new and flexible formula for public lands states will be far-reaching in its benefits, as will the liberal appropriations for forest roads and trails which reach a total of \$15,000,000 for the next two years. The clause which directs the secretary of war to transfer to the secretary of agriculture surplus war materials available for highway use will effect a saving of millions of dollars in the purchase of equipment and will modernize highway methods of construction and maintenance everywhere.

"Another provision of far-reaching importance is that requiring that states must match federal funds with funds from state sources or so controlled, with a qualifying time limit of three years to permit necessary changes in state laws to meet these conditions. The broadened definition of a highway department will require proper organization of these important units in the future.

"The authority granted the secretary of agriculture to undertake highway research in cooperation with independent agencies as well as through the government, will greatly stimulate study and the analysis of fundamental highway problems.

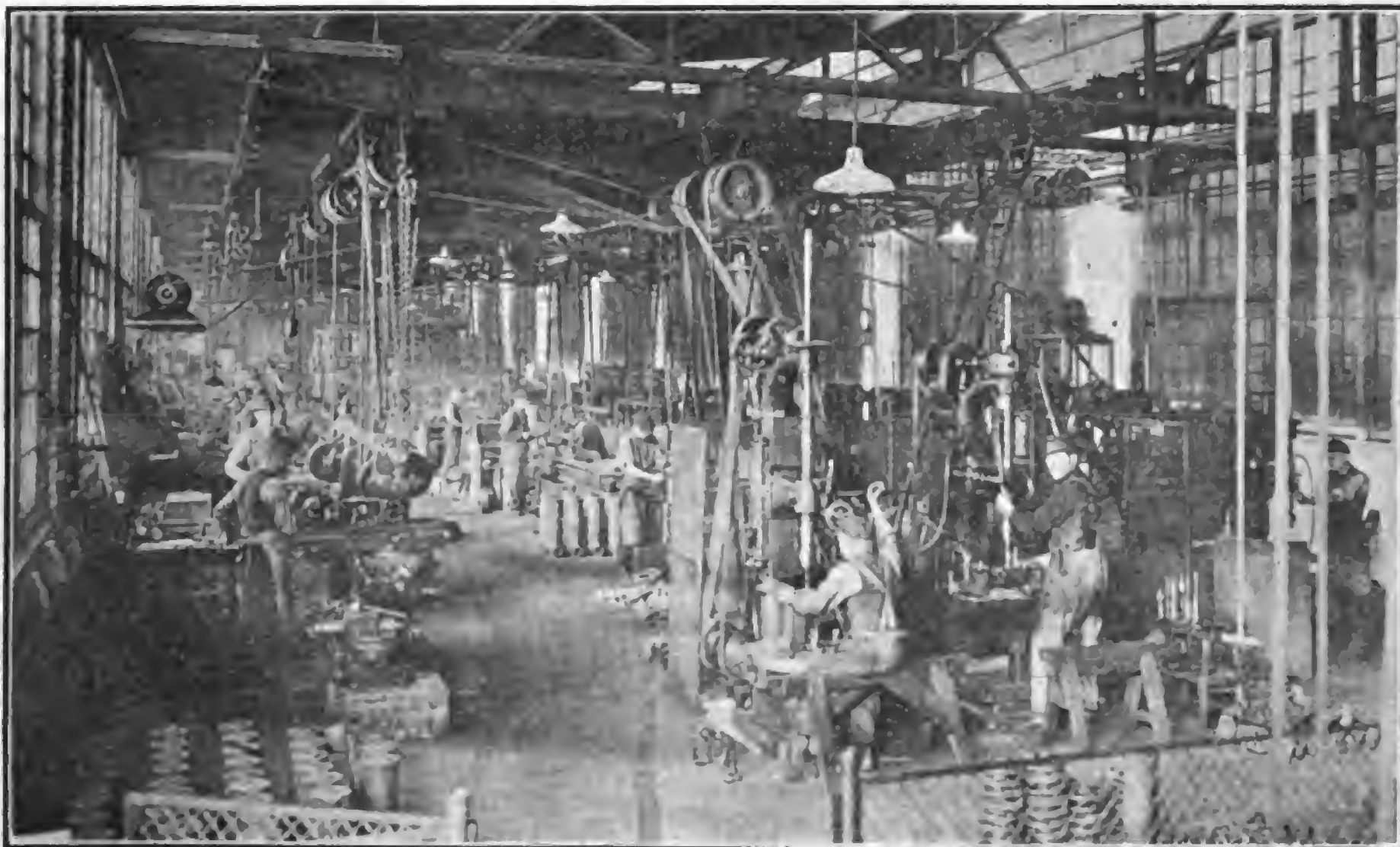
"These are some of the main changes. There are others, but sufficient have been enumerated to show that the educational campaign waged by Senator Townsend to bring about a clearer appreciation of the importance of the highway problem has been a successful one."

HIGHWAY CONFERENCE.

In connection with the second annual meeting of the Associated Pennsylvania Highway Contractors, which was held at the Penn-Harris hotel, Harrisburg, on Dec. 15, a highway conference was called for Dec. 16, to which every engineer, contractor, material producer, equipment manufacturer, banker and surety company were invited.

The programme for the highway conference Friday, Dec. 16, included the discussion from 10 a. m. to 1 p. m. of road construction from the view points of the banker, surety company, engineer, cement, coarse aggregate and fine aggregate producer. In the afternoon, 2:30 to 4 o'clock, the equipment manufacturers and the Pennsylvania state highways sides of road construction were presented, and the "Mechanical Handling of Road Materials" was discussed. The annual dinner was held at 7 p. m.

The talks were limited to 15 minutes and discussions to five minutes—total time of each subject, 30 minutes.



Section of Hydro Holst Co.'s Milwaukee, Wis., Plant—This Manufacturer Builds a Well-Known Under-Body Type of Holst.

Road Experts Pass on Final Design

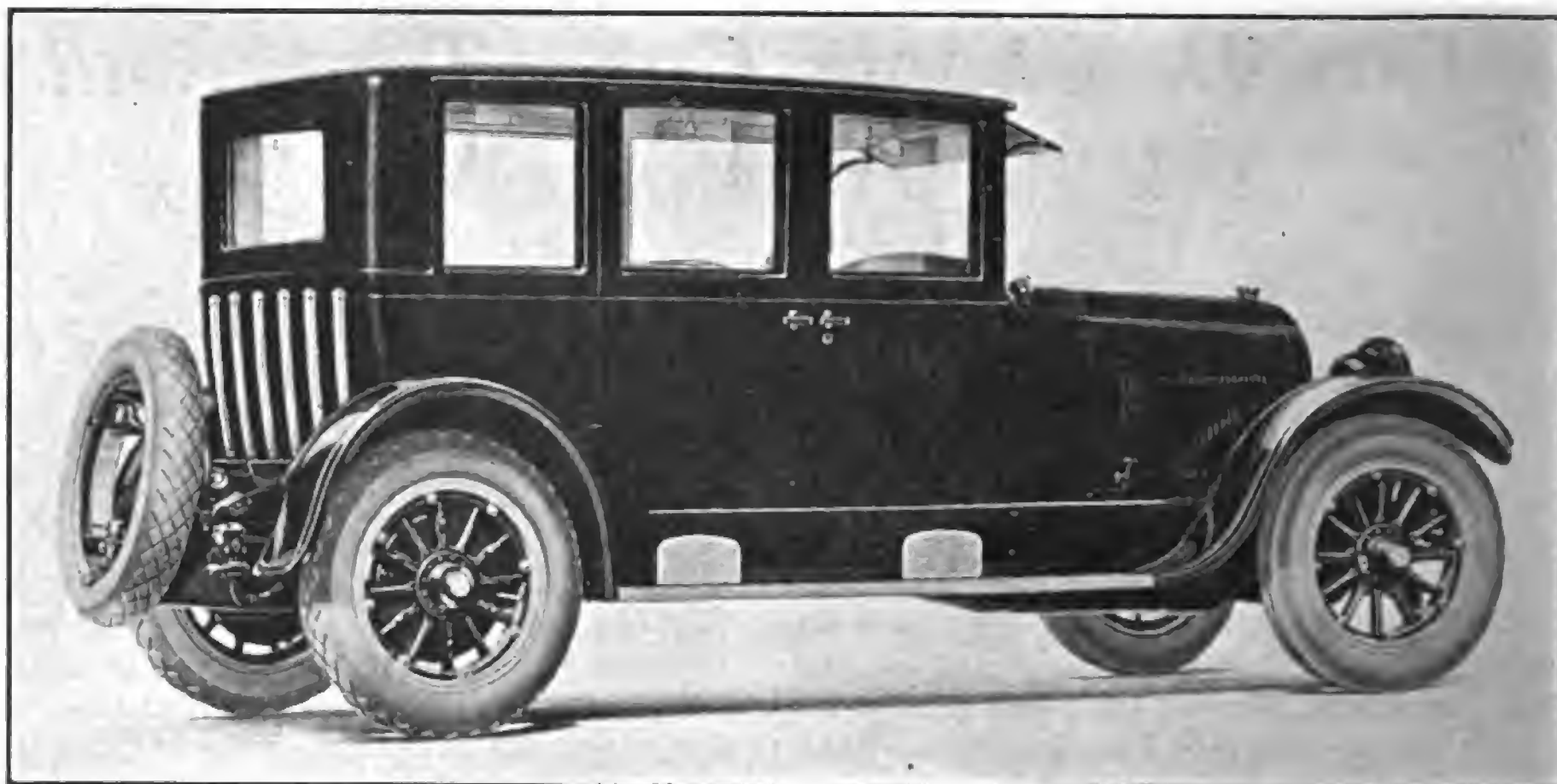
Inspect Site for Model Stretch of Lincoln Highway in Lake County, Indiana.

CHICAGO, ILL., Dec. 14.—Leading highway experts of the United States and nationally known authorities on such related subjects as highway beautification and automotive design, met here at the University club to consider the finally developed plans for the construction and embellishment of an "ideal section" of the Lincoln highway. These men, picked from the national leaders in their various fields of expert knowledge, form the technical committee of the Lincoln Highway association which was appointed over a year ago by the association to consider the important problem of the proper design for America's main highways and to draft, in consultation, a set of specifications representing their vision of the ultimate development of the modern main highway.

At meetings held here and in New York, in December, 1920, and February, 1921, unanimous agreements were reached as to the main features of the design and the essential specifications. Since that time the Lincoln Highway association, after a careful reconnoissance of the possibilities along the entire trans-continental route, has tentatively determined upon the construction of this model stretch of road in Lake county, Indiana, about 37 miles south of Chicago. The cooperation of the State of Indiana and of Lake county has been sought and assured; detailed surveys of the proposed location between Dyer and Schererville have been made and final plans, applicable to the location and following the general specifications of the committee, have been prepared.

Plans Approved by Committee.

At the morning meeting the committee unanimously approved the detailed plans for the section, prepared by Lockwood,



Closed Cars Are Fast Gaining in Popularity—This Strikingly Beautiful Cadillac Sedan Will Do Its Share to Swell the Ranks of All-Year Drivers.

Greene & Co., engineer, and W. G. Thompson, consulting highway engineer, for the Lincoln Highway association. These plans call for a section approximately $1\frac{3}{4}$ miles in length, which it is believed will be adequate to impress the lessons the association and the committee have endeavored to embody in the design. The plans comprise 40 feet of reinforced concrete pavement, 10 inches thick, laid in the center of a 100-foot right of way, the outer 25 feet of which, on each side, will be landscaped and beautified under the direction of Jens Jensen, the well-known Chicago landscape architect. There will be no open ditches, drainage being provided by submerged drain tile. A sidewalk is included for the safety of pedestrians and the paved way will be illuminated by the most modern and economical system, devised by the illuminating engineers of the General Electric Co. One bridge is included in the plan and this also will make provisions for foot passengers as well as providing a full 40 feet of width for vehicular transportation.

Section Designed for Peak Travel.

It should be borne in mind that the roadway which the Lincoln Highway association plans to construct next spring at the location mentioned was designed by its committee of experts to represent

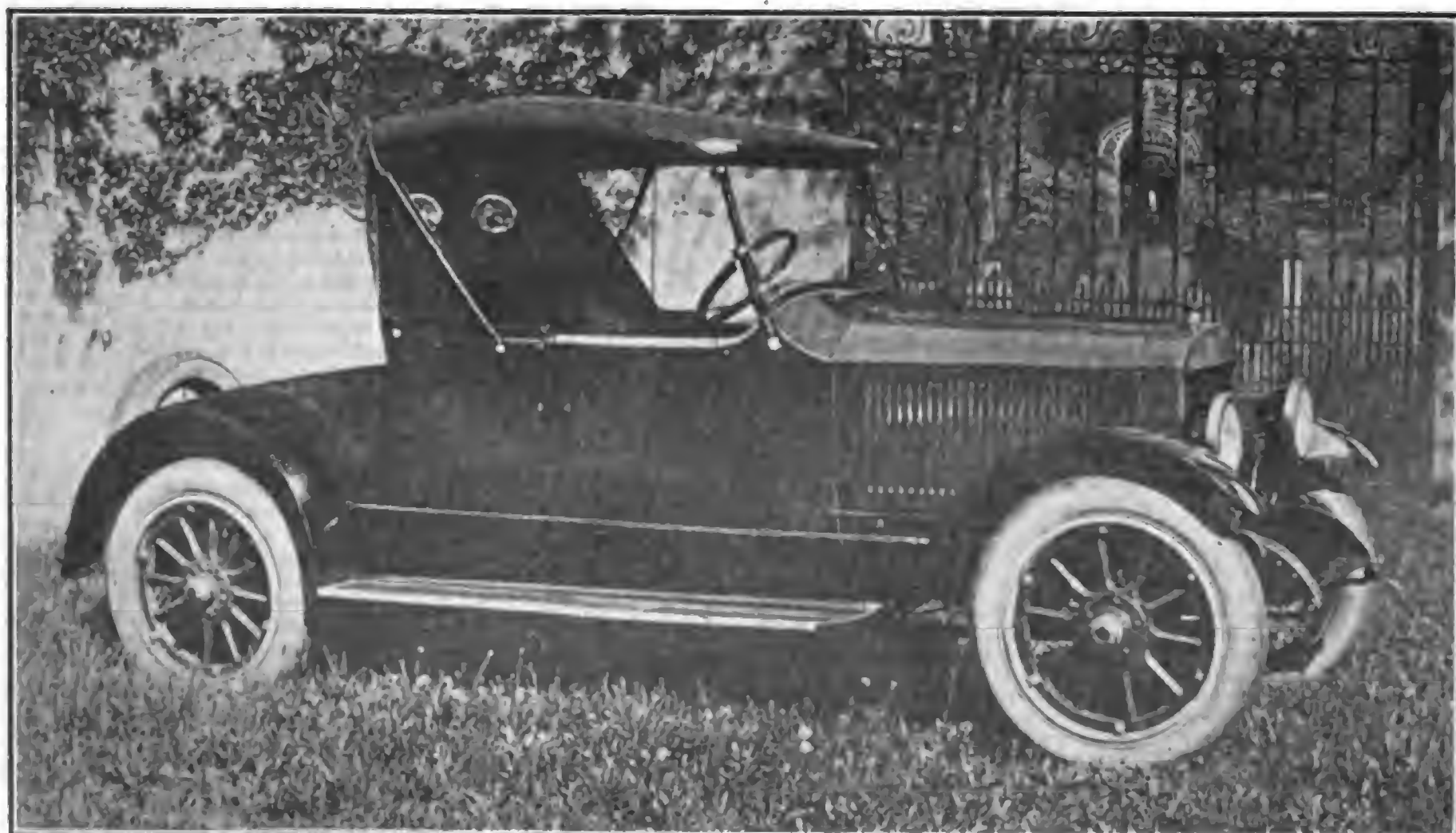
the highest possible development needed on the heaviest travelled sections of the most important highways in the United States. In designing the ideal section, the association's technical committee had in mind an ultimate traffic volume of 20,000 vehicles per 24-hour day and assumed that 5000 of these vehicles would be motor trucks, carrying freight. While this is a traffic slightly beyond that now encountered on any road in the United States, it is not beyond that which is bound to develop on many of our most important arteries of transportation during the life of roadways laid in the immediate future. The nature of the design bears no relationship to the traffic volume now existing on the Lincoln highway at the location tentatively selected. This location is being considered because it is central as regards the United States as a whole and convenient to Chicago, while yet being in the open country.

Lessons Embodied in Ideal Section.

National interest has already been aroused in the Lincoln Highway association's practical plan for crystallizing the best thought in America as related to modern highway design. Once built, the ideal section will be subjected to constant study by the United States Office of Public Roads and by road-building agencies in every section of the country. In fact, it will be internationally famous as the most perfect stretch of modern roadway constructed anywhere to date. International interest will center on this section of improvement. Already the association has received from many foreign countries, requests for information as to the nature of the design, and A. F. Bement, vice president and secretary of the Lincoln Highway association, has been asked to prepare a paper, relating to the ideal section design and its significance to motor transport, before the Fourth International Road Congress to be held next spring in Seville, Spain.

The cost of this educational section of modern road will be borne jointly by the United States government, the State of Indiana, Lake county and the Lincoln Highway association. The association, which initiated the project which is expected to have such a far-reaching effect upon the ultimate design of Amer-

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New Stanley Roadster Completes Stanley Line, Offering Steam Enthusiasts a Powerful Business Car Capable of Hard Service.

Makes Coordination of Effort Possible

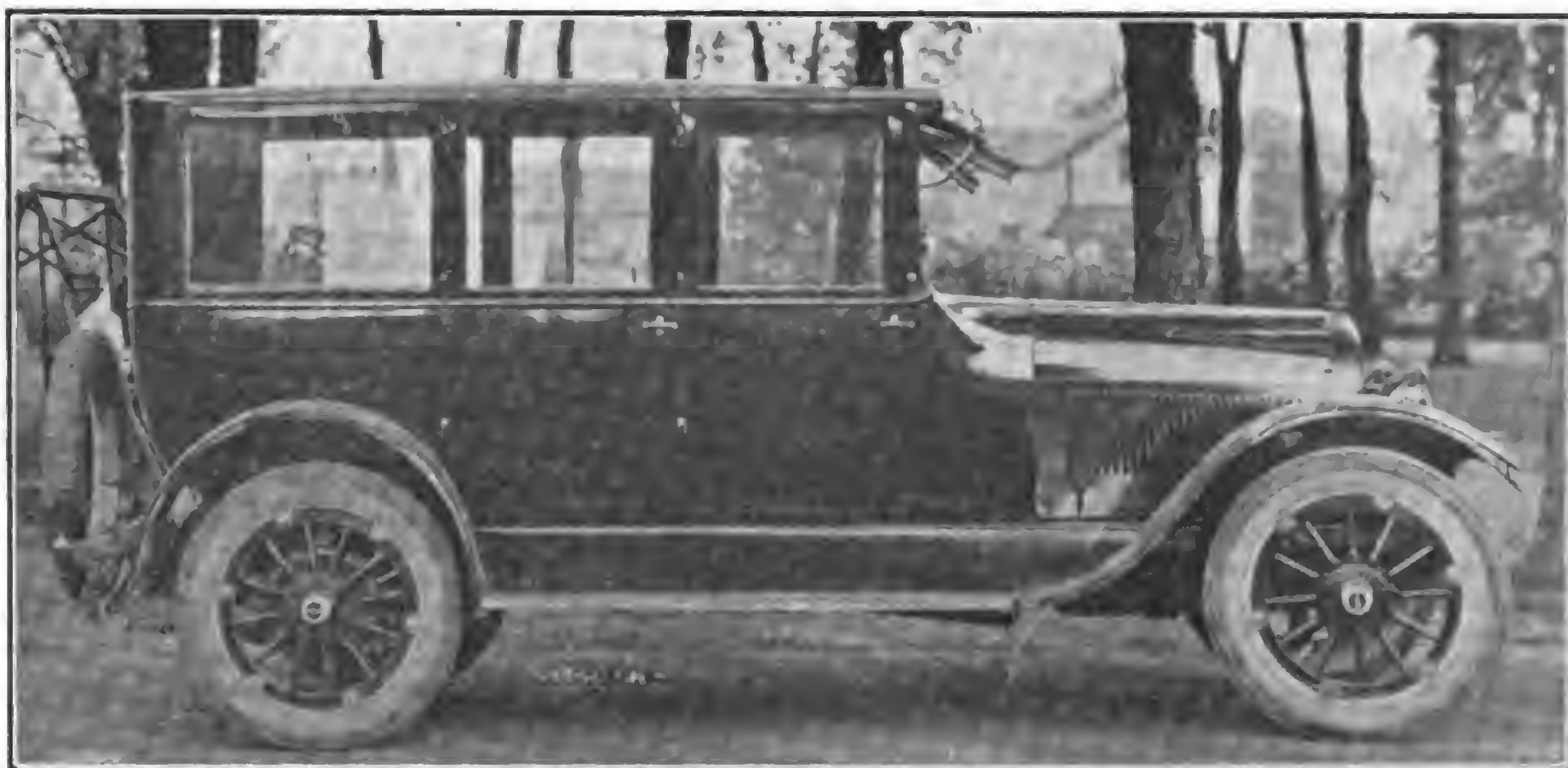
Society of Automotive Engineers
Figures Prominently in Cutting
Cost of Manufacture.

NEW YORK, Dec. 14.—Simplification is probably one of the most important means of cutting production costs, but it cannot be accomplished by the individual manufacturer without the whole-hearted support of the financial, sales and production executives. To obtain the greatest reduction in cost it is necessary, however, that such simplification be carried beyond the plant of the individual manufacturer until, by cooperative effort, a national simplification is accomplished which will react with tremendous advantage to each manufacturer. Such cooperative simplification, or standardization, between manufacturers is carried out most advantageously by trade organizations.

In the automotive industry the Society of Automotive Engineers, functioning through its Standards committee, makes possible this coordination of effort which has resulted in the application of standards and consequently the cutting of production costs to a great extent. Additional standards, each representing a possibility of reduced costs, will be acted upon at the Standards committee meeting on Jan. 10 in New York. Sixteen divisions representing different fields in the automotive industry and part or material manufacturers will present over 30 proposals for adoption.

APPOINTS AD MANAGER.

LOUISVILLE, KY., Dec. 11.—Elmer F. Brandell has been appointed advertising manager of the Stratten-Terstegge Co., which manufactures the Monarch furnace, also a general line of galvanized ware. Mr. Brandell is well known in the



Elegance of Design Combines with Well-Proportioned Lines to Make Stephens Cars a Worthy Addition to the List of Truly Fine Automobiles.

automotive field, formerly having been advertising manager of the Woke Lead Batteries Co., Louisville.

NEW MERGER PLANNED.

BOSTON, MASS., Dec. 12.—The Financial News Service printed the following on its ticker a few days ago:

"There is now in progress of organization the largest company in the history of the world, having a total authorized capital of \$2,000,000,000, double the size of the United States Steel Corporation. The company is to absorb oil companies in various parts of the world.

"The new company is to be known as the World Commerce Co. The capital is to consist of 100,000,000 shares of preferred stock and 100,000,000 shares of common stock each of \$10 par.

"It is understood the Land Title & Trust Co. of Philadelphia is now working out the details which are expected to be announced in the no-distant future.

"At the moment it is known that nine other companies are already lined up to become part of the new organization, and while the names are not now available for publication, it is known that five of them are well-known concerns.

"The new combine will include oil com-

panies of the United States, Central and South America and other parts of the world, and four of the companies are not very well known to the American public.

"Just what proportion of the authorized capital will be issued at the time of organization is problematical as the companies which will go into the new combine will exchange their shares for those of the World Commerce Co., and thus the outstanding capital of the new company will be regulated by the number and size of the companies becoming a part of the new organization.

"There has been some talk that the Standard Oil is interested in the organization, but no confirmation of this can be had at the moment. It is said, however, that the Mexican Petroleum will not be included. On the other hand the Transcontinental Oil Co. is said to be one of the American companies that will be included.

"Presumably the intention of the new company is to place the United States in a position to compete in the world's oil market with foreign companies, and with oil properties in various parts of the world. This country will then be on a par with the interests of other countries."

Editor's Note—The foregoing, though interesting, cannot be checked up, although there is a well-defined rumor in Boston and New York financial circles that the report as printed has authentic foundation.

(Continued from Preceding Page.)

ica's main highways, is bearing the largest portion of the expense through a fund appropriated to it for the purpose by the United States Rubber Co., the officials of which are greatly interested in the association's work. J. N. Gunn, vice president of the United States Rubber Co., president of the United States Tire Co. and of the Lincoln Highway association, attended the meeting here and expressed himself as greatly pleased over the final decision of the committee.

H. A. Coffin has become associated with the Cadillac Motor Car Co., Detroit. He was previously secretary of the Detroit Pressed Steel Co. also of Detroit.



New Jordan Car: From Left to Right, the Men Are Jay H. Kelly, Factory Manager; Paul Zenn, Treasurer; W. B. Riley, Sales Manager, and Edward S. Jordan, President.

Commerce Chamber to Aid Industry

Series of Open Hearings to Be Conducted in Interest of Goods Distribution Plan.

WASHINGTON, D. C., Dec. 12.—In its investigation of the varied problems affecting the distribution of goods, the committee of the Domestic Distribution department of the Chamber of Commerce of the United States will hold a series of open hearings in different parts of the country. These hearings are being arranged geographically, so that every section will have an opportunity to be heard. In this way the committee hopes to learn what the problems of distributors are.

The first of the hearings has just been held by the committee at Kansas City. More than 100 representatives of trade, commercial and agricultural organizations from the Middle West, together with a number of business men from Kansas City, were in attendance. The hearings developed helpful information as to the distribution problems of the Middle West, which the committee will be able to use in its study of the whole question of distribution. As outlined by Theodore Whitmarsh of New York, chairman of the committee, three important distribution questions were dealt with:

Problem of keeping up sales; the re-establishment of confidence in prices, and the elimination of waste in distributive processes.

Among those who addressed the Kansas City conference were: Edward O. Faeth, president of the Kansas City Chamber of Commerce; Theodore Whitmarsh, chairman of the committee, New York; A. C. George, manager of the International Harvester Co.; Thomas E. Wilson of Chicago; Marco Morrow, representing the Agricultural Publishers' association; Herbert P. Sheets, represent-

SALES MANAGERS MEET.

GORDON LEE, chief of the automotive division of Foreign and Domestic Commerce, Department of Commerce, appeared before the National Association of Motor Truck Sales Managers on Dec. 2 and told in a very interesting manner just what the United States government is doing to promote interest in the automotive industry. He appeared as a special representative of Secretary of Commerce Hoover, delivering the address at the request of that cabinet officer.

ing the National Retail Hardware association; A. Lincoln Filene, Boston; J. C. Lester, Kansas City; J. C. Mohler, secretary of the Kansas State Board of Agriculture; T. R. Morehead, secretary of the Southwestern Lumbermen's association; Thomas S. Dennis, representing the American Wholesale Lumber association; W. C. Helmers, Kansas City; E. Y. Blum, secretary of the Leavenworth Chamber of Commerce; Alvin E. Dodd, manager of the Domestic Distribution department of the Chamber of Commerce of the United States; L. R. Putman, directing manager of the American Wholesale Lumber association, Chicago.

The members of the committee present at the meeting were Theodore F. Whitmarsh, New York; A. Lincoln Filene, Boston; Thomas E. Wilson, Chicago; R. E. Kennington, Jackson, Miss.; A. W. Shaw, Chicago, Ill.; L. T. Crutcher, Kansas City, and Alvin E. Dodd of Washington, manager of the Domestic Distribution department.

Sale of Equipment and Parts Is Good

Report on Automotive Industry During October Shows Healthy Industrial Conditions.

NEW YORK, Dec. 12.—Sales of parts and equipment by approximately 300 representative manufacturers selling to the principal car and truck makers, fell off five per cent. during October. At the same time the total amount of notes outstanding dropped a little less than six per cent. These are the two main features of the official monthly survey made public by the Motor and Accessory Manufacturers' association.

Credit managers and financial executives who contributed the figures and reports from which this monthly chart of conditions is plotted commented on the fact that in view of the normal seasonal conditions during October the figures are not at all surprising. The consensus of opinion seems to be that the improvement will be steady, fundamental, and hence somewhat gradual. Although no sharp spurt is expected over night, most students of conditions in the automotive industry look for a substantial upward trend immediately after the automobile shows in New York and Chicago next January.

The figures for the last nine months are:

Comparative Figures for 1921.				
Month	Change*	Change**	Change***	Change***
February	66.15†	17.07‡	39.08‡	
March	93.30†	16.57‡	16.38‡	
April	32.93†	4.49‡	5.94‡	
May	00.13†	15.64‡	16.77‡	
June	15.19†	4.79‡	10.37‡	
July	1.68†	10.79‡	7.90‡	
August	1.31†	17.06‡	5.30‡	
September	1.09†	00.22‡	5.24‡	
October	4.70‡	3.54‡	5.82‡	

*Purchases of parts, units, equipment, etc., by automobile passenger car and motor truck makers from 3000 parts and accessory manufacturers by months—per cent. change.

**Totals of notes outstanding—per cent. change

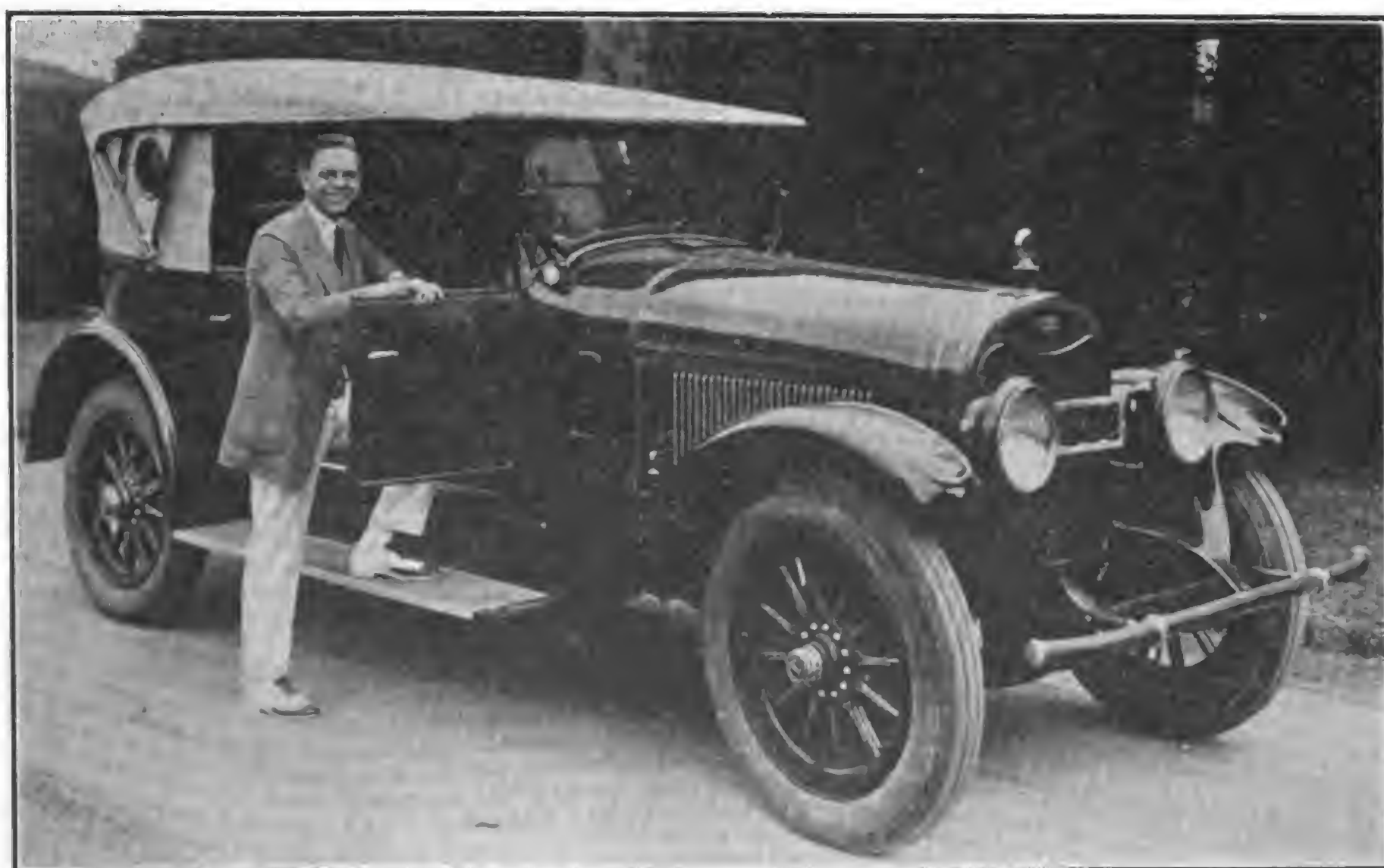
***Totals of past due accounts reported—per cent. change.

GERMAN FORD PLANT.

DETROIT, Dec. 9.—A factory in Germany for the manufacture of automobiles for German, Russian and other Eastern European fields is being planned by the Ford Motor Co., it became known today. Charles E. Sorensen, a member of the Ford organization, left for Germany a fortnight ago. At present he is in London, following a visit to the Ford plant at Cork, Ireland. He will start for Germany within a few days, according to information here.

The present plan provides for the purchase of a large plant in Germany.

Edward P. Kerruish, formerly in charge of the drafting room of the Winton Co., Cleveland, has been made assistant engineer of the company.



The Most Salient Feature of This Lincoln Car Is the General Effect of Good Proportions.—It Is Unusually Well Designed and Conveys the Impression of Balance.

General Convention Is Marked Success

"Meeting Unique" Wins Approval of California Trade Association Members.

BAKERSFIELD, CAL., Dec. 11.—Bakersfield was the mecca for the automobile men of California on Dec. 5 and 6 and the general convention of the California Automobile Trade association was the attraction.

A "meeting unique" had been promised—entirely different from anything attempted at any other convention held by the association—and it lived up to the forecast. The Kern County Automobile Trade association, which was the host, put on a wonderful business session and, in addition, the purely amusement features provided were all that the most critical could ask.

The list of speakers included the following: J. F. Thompson, general manager of the Willys-Overland Co.; Carl E. Rosenberg, sales auditor, who answered the question, "What to do when the customer says 'No';" Daniel N. Jones on "Industrial Relations;" Woodworth Clum on "The Better American Federation;" Mr. Lefferty of the Automobile Club of Southern California; D. R. Robinson, director of research of the First National bank of Los Angeles, who was also a member of the National Commerce of Defense; H. J. Banta on "The Employer's Greatest Responsibility;" L. H. Bennett, on "The Relationship Between Jobber and Retailer," and Bob Martland, who gave a characteristically interesting talk.

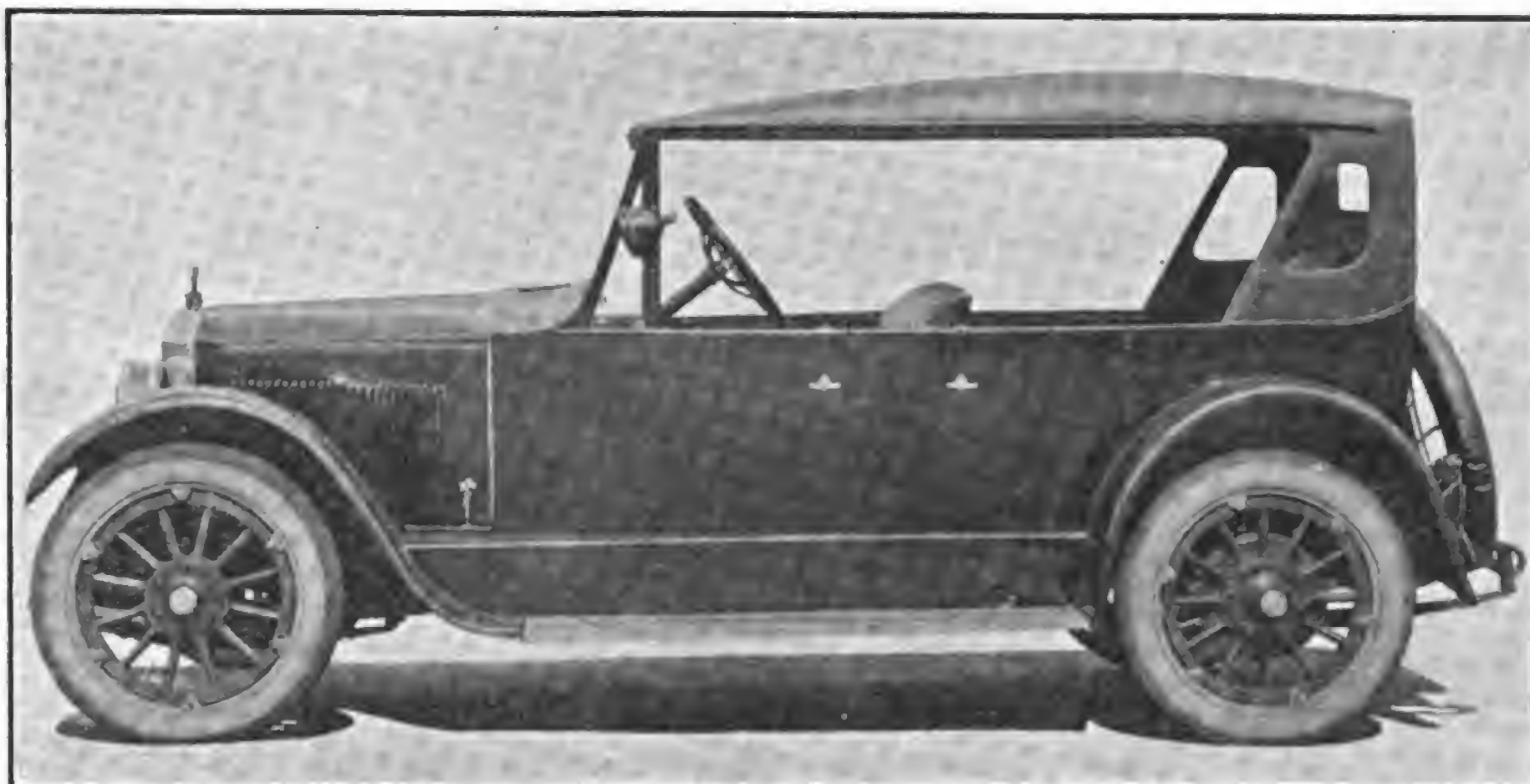
Entertainment was provided for the ladies while the men were in session. A big dance was given by Bill Drury on Tuesday evening—and, last but not least, wonderful shooting opportunities and golf links gave their quota of fun to those members who, advised to bring their guns and golf clubs, put in a wonderfully enjoyable time.

"A real conference," was the verdict of the many who attended the sessions.

ADVOCATES BUMPERS.

CLEVELAND, O., Dec. 12.—President W. G. Pancoast of the Biflex Products Co., North Chicago, Ill., which manufactures a widely-known line of spring bumpers, is a deep student of traffic subjects and his observation of accidents leads him to believe that many of them commonly reported from day to day could be prevented by the state legislatures passing suitable laws making it compulsory for automobilists to equip their cars with suitable bumpers.

"There is much talk of making adequate bumper equipment a legal requirement on all motor cars," he states, "just as properly focussed head lamps, safety signals and the like are prescribed by law in most states. It is a fact beyond dispute that the increase in automobile accidents is due to greater traffic conges-



This Well-Designed Merit Car, One of the Late Comers into the Automobile Field, Has All the Ear Marks of a Thoroughbred.

tion and not to greater carelessness in driving as is so often ignorantly charged. Resiliency is another factor of bumper protection. A stiff, rigid bumper is bound to damage both the car to which it is fastened and the car it strikes if the impact is of sufficient force."

(Continued from Page 645.)

ties are actually improved by the use of the less expensive tire and the rubber spring block equipment. It is claimed that this principle of spring suspension, which permits the use of solid tires for bus operation without discomfort to the passengers, is the greatest single improvement in bus construction ever made and that a short ride in a bus so equipped will convince the most skeptical of the merits of the invention.

Another chassis change is the removal of the gas tank from the interior of the body and placing it at the rear end where the danger to passengers from fire and explosion is minimized. The tail pipe of the muffler is carried to the rear so that the gases from the exhaust will not blow in at the side windows to the discomfort of the passengers, particularly while the bus is at rest.

Among the body improvements is a specially constructed flooring which, with the assistance of smaller diameter cushion tires, reduces the floor height to a point where all instability, side sway and tendency to overturn are eliminated. The low body also permits the use of low steps to give easier entrance and exit. Other improvements are the ample lighting of the bus for night service, a system for heating the interior in cold weather by means of the engine exhaust, special deep upholstery of imitation leather with tilted backs to provide greater comfort, seats placed crosswise, affording maximum comfort for long-distance riding and seating a greater number of passengers in the same floor space than the usual longitudinal seats. As an additional feature a special lighting system, known as the Newbold, can be furnished, consisting of a special generator, automatic regulator which charges the battery and feeds the lighting system at a constant rate irrespective of the speed of the engine, thus prolonging the life of the battery and lamps. It is claimed that the saving effected by the use of this system will offset its additional cost.



Showing Manner by Which Hankee Signal Is Operated from a Small Electric Motor in Each Arrow, Which Takes Current from the Storage Battery.

Steal 83 Machines A Day

Figures from 28 Cities Show Staggering Theft Total Although Number Is Smaller Than During Previous Year, Says National Automobile Body.

(By HARRY G. MOOCK, General Manager, N. A. D. A.)

THIRTY THOUSAND AND FORTY-SIX automobiles were stolen last year in 28 "index" cities of the country and 21,273 of them recovered, according to the annual compilation of the National Automobile Dealers' association, with headquarters in St. Louis, Mo. The number stolen was 3012 less than in 1919, but was 2601 more than the number stolen in 1918. In 1918 cars unrecovered were 21 per cent. of the number stolen; in 1919 they were 26 per cent. and in 1920, 29 per cent.

Chicago took the lead from New York with the number stolen, although a higher percentage of cars remained unrecovered in New York. New York had 5179 stolen; Chicago, 5527. New York recovered only 2717 of her stolen cars, while Chicago recovered 4340. Dayton, O., had the unusual record of having recovered more cars than she had stolen.

PACIFIC coast cities kept up their yearly good work of recovery. There were 4877 cars stolen in Los Angeles, San Francisco, Oakland, Portland and Seattle, and 4175 recovered. The unrecovered cars were 16.4 per cent. of the total stolen, or approximately 50 per cent. of the average for the country.

The figures compiled from official sources for the 28 cities for which the N. A. D. A. has three-year statistics, are shown on this page.

As is shown by this compilation the number of thefts in these cities decreased in 1919-1920 about 10 per cent., while the general increase in the number of automobiles throughout the country was about 20 per cent. during the same period. The decrease in the number of thefts therefore is materially greater than would be indicated by the percentages. A considerable part of this decrease is attributed by the N. A. D. A. to the deterring effect of the National Motor Vehicle Theft law (the Dyer law), which was put through Congress at the instance of the N. A. D. A., and by more stringent laws in the states for the punishment of motor car thieves.

However, a good part of the better showing is due also to vigorous activity of the peace authorities, such as in Buffalo, where Chief of Police Higgins, known as the "youngest police chief in the United States" is making a determined drive against the automobile thieves; and in St. Louis where the office of the circuit attorney, cooperating with the police department, has virtually put

the professional automobile thieves in the state penitentiary; most of them convicted there received long terms and it is expected that

vigorously by the N. A. D. A. because of the theft insurance rates now having become so high as to prove a big factor in the resistance to the sales of automobiles.

AUTOMOBILE THEFT RECORDS.

	STOLEN			RECOVERED		
	1918	1919	1920	1918	1919	1920
New York	3,340	5,527	5,179	2,578	3,124	2,717
Chicago	2,611	4,447	5,974	1,954	3,447	4,340
Detroit	2,639	3,481	3,300	1,934	2,529	2,563
Cleveland	2,076	2,338	2,649	1,816	1,786	1,765
Los Angeles	1,629	1,688	1,654	1,499	1,365	1,152
Kansas City	1,144	1,661	801	606	794	341
Portland, Ore.	1,088	1,528	465	990	1,378	418
Denver	901	1,440	858	627	1,187	651
San Francisco	1,122	1,354	1,186	1,082	1,304	1,156
St. Louis	2,241	1,241	788	1,354	944	641
Seattle	1,451	1,422	1,008	1,376	1,398	909
Indianapolis	404	1,031	1,152	334	692	833
Boston	866	1,002	480	607	580	297
Salt Lake City	797	776	592	790	758	555
Oakland, Cal.	895	760	564	860	733	549
Omaha, Neb.	1,039	734	634	669	567	507
Columbus, O.	451	550	513	352	373	278
Cincinnati, O.	348	520	525	291	293	273
Oklahoma City	571	149	205	484	70	133
Albany, N. Y.	41	133	87	29	104	70
Buffalo, N. Y.	1,262	986	743	914	700	507
Newport, R. I.	4	9	12	4	9	12
York, Pa.	6	10	8	6	9	8
Grand Rapids, Mich.	152	189	262	149	137	250
Richmond, Va.	84	207	148	62	161	93
Dayton, O.	207	228	198	241	213	217
Lowell, Mass.	26	25	18	16	17	7
Evansville, Ind.	50	72	43	49	68	40
Totals	27,445	33,508	30,046	21,673	24,740	21,273

1918, 5772—21% of number stolen.
1919, 8768—26% of number stolen.
1920, 8772—29% of number stolen.

thefts in St. Louis will show a steady decrease from now on.

The subject of theft is being watched

It is realized that until thefts are materially checked little progress can be made in the matter of insurance reductions.

PROPER GEAR LUBRICATION.

The proper lubrication of transmission and differential gears is of vital importance; more so than the motorist realizes. Because these parts are unseen and usually more or less difficult to reach, they are often neglected. All of the power generated by the engine is transmitted through these gears to the rear wheels and, unless one likes to buy gasoline, it is essential that the bearings and gears be well lubricated. Otherwise

there will be excess friction for the engine to overcome.

WELDING STEEL AND IRON.

Take 50 parts of clean iron filings, five parts sal-ammoniac, three parts borax and two parts balsam of copaiba and mix thoroughly. Heat the steel to a red heat, knock off the scale and apply the compound. The iron in the meantime is heated to a white heat and the pieces are welded in the ordinary manner.

GASOLINE LOGIC.

A simple but frequently forgotten precaution in regard to filling the gasoline tank is that the mouth of the gasoline can should be carefully wiped off before filling to remove any dust or dirt that may have lodged there, otherwise in the absence of a strainer the gasoline will carry the accumulated dust into the tank and later there will be trouble with clogged pipes and strainers on the fuel line to the carburetor.

(Continued from Page 618.)

"volatility." The vaporization quality of gasoline determines whether it puts "pep" into the motor, or whether the engine sputters, chokes and refuses to go.

The starting ability of a motor depends entirely on the volatility of the gasoline at the temperature of the air, which is sometimes below zero. Gasoline that is too volatile at atmospheric temperatures evaporates from the tank and from the carburetor and is wasted. Good gasoline has just enough, and no more, of the very volatile parts to insure good starting, and to hasten the burning of each fresh charge. Power for the quick get-away, to carry the car over the hills, and for speed on the level, comes from the less volatile components of gasoline. The range of volatility is the important factor, and the one in which most gasolines differ widely.

The range of volatility makes a difference in the miles received from each gallon of gasoline used. It also determines whether or not all the gasoline will be consumed, or whether it will condense into drops in the engine intake manifold and work its way into the cylinders past the piston rings and into the lubricating oil, or whether it will carbonize the spark plugs and cause the ignition to fail. It determines the difference between good and bad gasoline.

Volatility is measured by the "boiling point" of the gasoline, this being the temperature which must be reached before certain fractions of the gasoline begin to evaporate. The distillation test by which the volatility or boiling point of gasoline is controlled is made by meas-

uring a definite volume (100 cubic centimeters) of gasoline into a standard glass distillation flask. The flask is stoppered with a cork, through the center of which passes a thermometer, so that the top of the thermometer bulb is just below the vapor outlet tube of the flask. The flask is connected with a suitable condenser and surrounded by a hood to prevent draughts. A graduated receiving cylinder is placed at the outlet of the condenser, being connected to the condenser by means of an adapter. Heat is applied by means of a small flame to the bottom of flask and regulated so that rate of distillation is constant throughout.

The temperature at which the first drop falls into the receiver is known as the "over point." The volume of the distillate is then noted at the next and each succeeding even 10 degrees Centigrade (18 degrees Fahrenheit). The highest temperature recorded by the temperature of the thermometer at the end of distillation is known as the "dry point." The over point, dry point and observed volumes at various temperatures must meet specifications. Gasoline with the range of boiling points that are scientifically correct can be made economically in large quantities by a concern that has sufficiently large plant facilities and a large market in which to distribute the many other side products of crude petroleum.

Calorific Power.

The automotive engine gets its power from heat. Tremendous heat is generated when the mixture of gasoline vapor and air is exploded in the cylinder combustion chamber. The temperature is

about 3000 degrees Fahrenheit, while the explosion is quick burning.

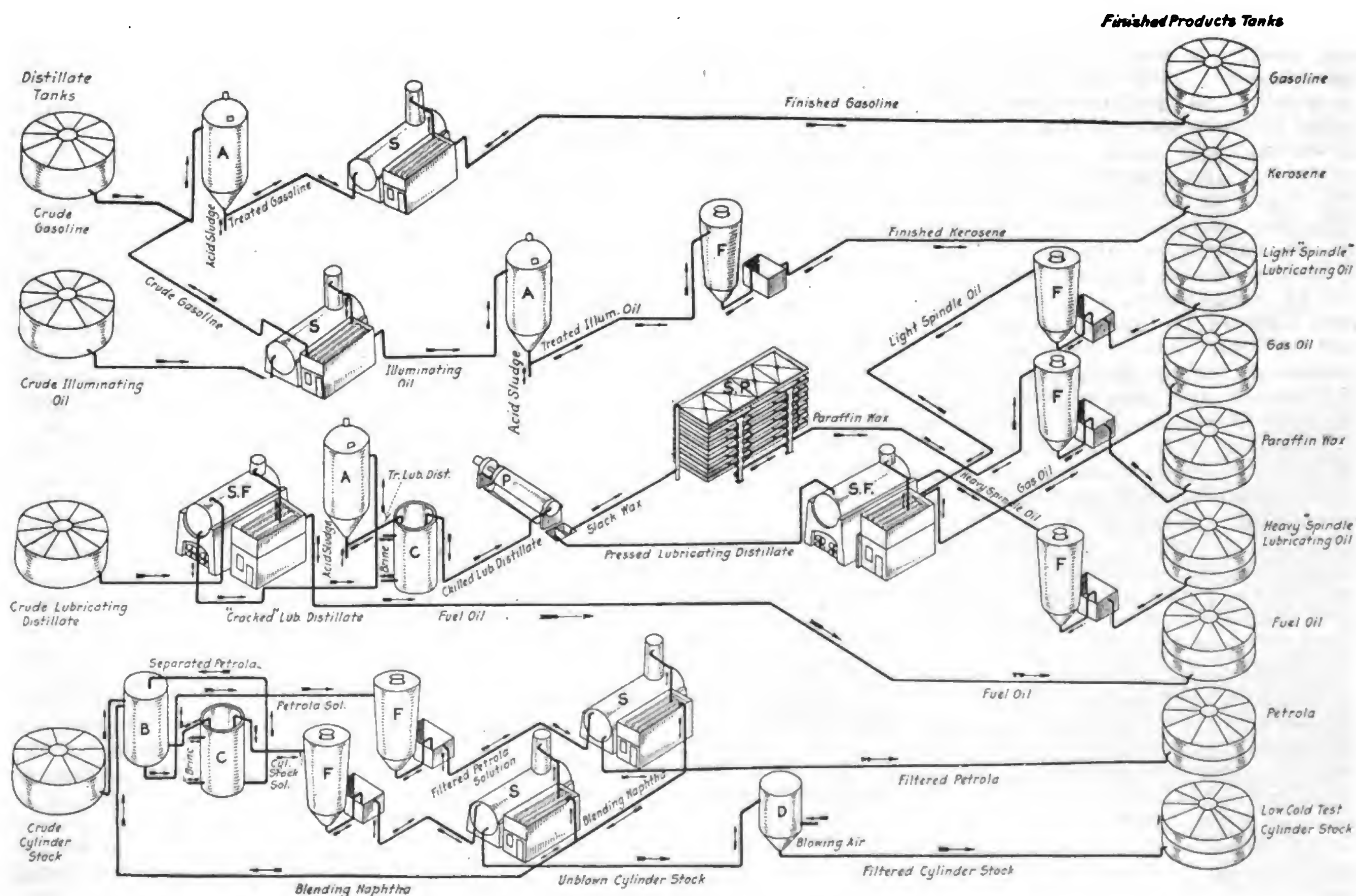
The heated gas expands with tremendous force, and the piston is driven down in much the same manner that a cannon ball is shot from the cannon. The connecting rod connects the force of the explosion to the crank shaft in the form of power that drives the vehicle.

Heat is the element that drives the vehicle. The success of the motor fuel depends on the heat which it contains, and on the ease with which that heat can be utilized by automotive engines. No matter how much potential heat a fuel may have, it will not prove satisfactory unless it can give up its heat so easily that it can all be used in the engine.

Purity of Gasoline Motor Fuel.

Gasoline to be considered pure must be free from acid, sulphur, water, sediment and other matter not hydro-carbons. Acids pit and corrode the metal of the carburetor, the valves and the vacuum system. Theoretically, at least, the products of the combustion of sulphur are acid and have a disagreeable odor. In too large quantities they cause trouble. Gasolines, as now marketed, are tolerably free from acid and sulphur.

Every motorist knows, from sad experience usually, that water and gasoline will not mix. Water in gasoline chokes the carburetor, causes the engine to run irregularly or to stop entirely, and it will not run again until the water is removed from the fuel system by draining and restraining through chamois. If water in the garage storage system is eliminated the fuel system of the car will not bother from this cause.



Tanks at Extreme Right Show Different Products Obtained After Final Stages of Refining the Crude Petroleum—Like the Preceding Diagram, This Chart Is Not So Intricate as It Appears and the Reader Will Be Well Repaid for His Study.



Battery of Sweaters—After Water Is Removed Wax Is Pressed into Bricks.

The sediment and dirt in gasoline is usually all removed in the refining process and if present in the fuel it probably enters from the storage tank or from dust which gathers as the tank of the car is filled. Restraining through chamols will remove the dirt and sediment, preventing further trouble from this source.

All crude oils contain a portion of unsaturated compounds like those related to the asphalts. If these are allowed to remain in the gasoline the products of combustion form sticky deposits that are likely to gum or stick the valves of the engine.

Four Sources of Gasoline.

For convenience in classification, all gasolines may be included under four heads: First, natural; second, cracked; third, by-product; fourth, casinghead. The so-called "natural" gasolines are recovered from the first distillation of petroleum in "crude" stills. Gasolines are also recovered as by-products from many other processes of refining but, as a whole, they closely resemble the "natural" or straight-run gasolines. From still another source, gasolines are recovered by compression and condensing under pressure the gases coming from crude oil wells. Sometimes these gases are made to bubble through heavy oils which absorb the condensable portion. Subsequent distillation liberates the very light gasolines which they hold in solution. These volatile compounds are known as "casinghead" gasolines. They are much more volatile than other gasolines on the market and are seldom used without blending. Adulterations of different gasolines with kerosenes are also sold as gasoline, but such mixtures are to be avoided for many reasons.

The urgent demand for more gasoline than could be produced in the ordinary way has led to the development of "cracking" processes. "Cracked" gasolines have come into general use during recent years and are excellent motor fuels. In general terms the principles involved in the Burton, Hall, Rittman and other cracking processes consist of decomposing or "cracking" high boiling point petroleum products by means of heat and pressure, into a light volatile

fraction, a heavy residual and free carbon. The distillate from the "cracking" stills is the source of "cracked" gasolines which have the distinct characteristic of a higher degree of unsaturation than those produced by other distillation methods. When any hydro-carbon contains a smaller percentage of hydrogen than is normal, it is said to be unsaturated. The degree of unsaturation in "cracked" gasoline, usually recognizable by the odor of the finished product, varies with the method of manufacture and finishing. The effect of unsaturation on carburetion or power delivery is of such small consequence as not to be apparent in service. Comparing the calorific values of "cracked" with those of "natural" gasolines, the maximum difference noted does not exceed two per cent. Well-known brands of gasoline at present on the market are composed mostly of mixtures of gasolines from several different sources. They are mixed in such a manner as to give the correct volatile properties of motor fuels, are generally uniform in physical and chemical properties as production methods permit and, for all practical purposes they may be considered as perfectly uniform in fuel value.

Casinghead Gasoline.

As has before been stated the term "casinghead" applies to all gasolines made or extracted from natural gases. These gasolines can be made by compression of the rich vapors coming from the casing heads of oil wells and also by absorption from the lean gases from oil wells. As heating of the gases results from this compression, they are cooled again through coils, and the gasoline which has been carried up to this point as vapor, is in this manner condensed, collected and stored in tanks.

By the absorption method the natural gas is brought into contact with a refined petroleum oil which does not contain any gasoline and thus has the capacity to absorb the natural gas and the oil from it is later distilled by the use of steam. The natural gas, which has thus been cleared of its gasoline content, is then used for domestic and industrial purposes. The petroleum oil passes over and over again through the system, in this way continuously absorbing the gas-

oline vapors in the natural gas and, by steam distillation, again giving up the gasoline. These "casinghead" gasolines are very light and are used principally, as has been stated, for mixing with heavier gasolines.

Many efforts have been made by refiners to arrive at some acceptable specification for the identification of motor fuel to be known as gasoline, but up to the present time manufacturers have not been able to come to an agreement as to the fuel requirements of the internal combustion engines as known in the automotive industry today.

Unfortunately for the motorist the full chemical and physical properties of gasolines can only be dependably determined in a laboratory by more or less experienced men. In routine tests the gravity is first determined entirely as a matter of habit and not because it necessarily has any bearing on the desirable qualities of the gasoline. Next, a distillation of a fixed quantity of gasoline is made in a standardized distillation apparatus as heretofore explained.

The Van Dyke test has been adopted as standard for testing volatile gasolines intended for use in aviation engines. This test, however, is one of extreme exactitude and most automotive engine gasolines will not show perfect scores. The apparatus is simple, consisting of spun copper hemispheres, or cups, $3\frac{1}{2}$ inches in diameter, polished on the inside. The gasoline to be tested is poured into the cup, nearly up to the top, and then placed in a steam bath where the gasoline is slowly evaporated to dryness. To indicate what this test reveals, there are two principle findings, namely: First, the tendency of engine fuels to form gums on evaporation; second, the tendency for the acid compounds present in the fuels to corrode the polished copper, which is very susceptible chemically toward such corrosion. The best types of gasolines, from a purity point of view, are those which leave no deposit whatsoever on the polished interior of the copper, on the one hand, or show no blackening of the surface due to the etching action of organic or inorganic acids, on the other. As already pointed out, this test is one of extreme delicacy since the presence of relatively small amounts of acids or gum-forming compounds will at once be detected. In general, it may be stated that gasolines which cause a decided blackening and etching of the copper are not of the best quality. Gasolines which leave behind black or reddish oily resins in any appreciable quantity have not been completely refined. The Van Dyke test is not difficult to make, even outside of a fully equipped laboratory. The simplest and least dangerous means of providing a steam bath in which to set the cups, if laboratory equipment is not available, is to utilize an ordinary oat meal boiler heated by an electric hot plate. This combination totally eliminates any danger of fire or flame. In making this test care should be used at all times to prevent the accumulation of gasoline fumes (which are heavier than air and settle to the floor) in a closed room, where they might be ignited, causing a serious explosion.

In all liquid gasolines there is a certain percentage of absorbed gas. When the gasoline is atomized, this absorbed gas is freed and forms the most readily ignitable part of the fuel charge. Aside from this gas all the remaining liquid constituents in the gasoline must be vaporized. The most vigorous form of vaporization is that of boiling. Heat energy is always required for vaporization, since vaporization represents a certain definite amount of work which must be done. Anyone can prove this for himself by pouring a small amount of ether into the palm of the hand and allowing it to evaporate. It will be noted that the temperature of the hand is thereby perceptibly lowered, owing to the heat absorbed during vaporization.

Action of Lean and Rich Mixtures.

With these every-day examples in mind, it is easy for the layman to understand just what occurs when a quantity of liquid gasoline is supplied from the carburetor jet into a stream of air and passes on into the explosion chamber. If more gasoline is fed into the air stream than is necessary to produce a correct explosive mixture, the resultant vapor will be wet and "rich." The ignition of such mixtures is the cause of clouds of black smoke. On the other hand, if an insufficient amount of liquid gasoline is fed, ignition is retarded and the efficiency of the engine is thereby reduced.

The mechanism of the combustion of carbureted air consists first of supplying sufficient energy (engine-timed ignition) to break up the molecules of the combustible into its constituent atoms, and thus start flame propagation. In the case of hydro-carbon fuels, these constituent atoms are represented by the elements, carbon and hydrogen. In the first stages of combustion and at the moment of molecular disintegration, if there is an insufficient supply of oxygen to combine chemically with both the hydrogen atoms and carbon atoms, then the hydrogen atoms combine with the oxygen to form water in a gaseous form, while only a part of the carbon atoms to which the hydrogen was originally attached is oxidized and burned into a gaseous form of carbon dioxide or carbon monoxide. The remainder of the carbon atoms fall in the form of lamp black and is one source of sooty carbon deposits. When such oxygen-poor mixtures are burned, the precipitated carbon is blown out with the gaseous products of combustion and forms the heavy black clouds of smoke which are noted issuing from the exhaust pipe. Considering the opposite conditions of lean mixtures, where the fuel is insufficient, flame propagation proceeds at such slow rate as to deliver very little pressure to the receding piston and the flame still exists within the explosion chamber when the inlet valve opens to admit a new charge. When the new charge comes in contact with the retarded flame, small explosions occur in the manifold and carburetor, recognized as "popping back."

Correct Proportions of Fuel to Air.

The correct proportions for efficient explosive charges vary between 16 parts

of air to one of gasoline on the lean side, just short of the "popping back" stage, and 12 parts of air to one of gasoline on the "rich" side. All automotive engines should operate satisfactorily between the two limits given. It is to be remarked, however, that the richer of these mixtures will give the greater power, while the poorer mixture will make for economy. A perfect mixture would be one which, at the time of combustion or explosion, would chemically use up all of the oxygen of the air and all of the hydrogen vapors, so that the products of combustion would contain only carbon dioxide, water vapor and the nitrogen of the original air supply. In making the adjustment of all carburetors the fuel supply should be cut down until "popping back" occurs. Next, the fuel adjustment should be gradually opened, only to the point where "popping back" ceases. This setting is one which will usually give the best economy. All carburetor adjustments should be made while the engine and engine parts are heated to operating temperatures.

Testing Gasoline for Purity.

The purity of gasoline and its adaptability for use in an internal combustion engine may also be judged by submitting the fuel to a burn test. This is very simple and any motorist can make it for himself by procuring a small porcelain crucible, pouring about 30 cubic centimeters of the fuel to be tested into the crucible, igniting it with a match and allowing it to burn freely to the end. The quantity and character of the residue left on the bottom of the crucible is an indication of purity. If the bottom burns practically clean, the gasoline is good; if a heavy deposit of carbon is left upon the upper walls of the crucible and a heavy black tarry deposit in the bottom, the quality of the gasoline is poor. An oily residue will be left behind in the crucible if the proportion of "heavy ends" is very large. Intermediate between these two results lie the qualities ranging from good to bad.

The majority of motorists lay the blame of engine carbonization to the lu-

bricating oils, but it has been definitely determined that much of the carbon deposit evil of today is directly due to the use of an improperly refined or mixed gasoline. In conducting the burn test, it is suggested that the porcelain crucible be set on a wooden block, and that while the burn test is being conducted the cups be not subject to a draft, otherwise the carbon on inside walls of the crucible may be unevenly deposited.

Preheating Assists Volatilization.

Since it is recognized that the best of service and the maximum number of miles per gallon can only be obtained by preheating the fuel mixture to a certain degree of temperature, it is important that the operator be careful to see that his engine is properly equipped with preheating devices before the gasoline is condemned as bad. It is necessary to remember that gasolines of different volatilities require different degrees of preheating to secure the best results.

A characteristic heat utilization of engine fuel is graphically illustrated and indicates that only a little more than 12 per cent. of the total fuel value is converted into useful work. In other words, the user is only able to get 3½ cents' worth of work out of every gallon of gasoline for which he pays 35 cents. The results were obtained with a modern motor car operating on a level road at a speed of 40 miles an hour, with the engine and carburetor in the best of condition and adjusted properly. Since these figures are indicative of the best average fuel efficiency, how small would be the useful work obtained if the carburetor was feeding a wasteful wet, rich mixture, as is often the case?

When engines are operated with very small throttle openings instead of full throttle the fuel efficiency naturally drops to only a small fraction of the usable horsepowers shown on the chart.

Efficiency of the Automotive Vehicle.

During recent years there has been much discussion regarding the efficiency of engines. From the motor vehicle operator's angle, efficiency is represented by the number of miles he can drive his

(Continued on Page 669.)



Battery of Fullers Earth Filters Under Construction at Modern Refining Plant.

"Heat-Treating" Simplified

This Dissertation Mentions Briefly Processes Through Which Steel Must Pass Before Being Made into Automotive Units and Explains the Methods Now in Use.

WHAT is the meaning of the phrase "Heat Treatment?" One sees it used in the catalogues of the passenger car, truck and tractor manufacturers in relation to steels and other metals and perhaps has a somewhat general idea of what it stands for, but it is doubtful if the layman has other than an abstract knowledge of its meaning. It may also be asserted that perhaps only a small proportion of the so-called engineers are thoroughly competent to discuss its various phases, although the nature of their work would seem to demand that they have at least a practical knowledge of the processes necessary to secure correct results. The following dissertation, embracing the fundamentals of the science, was compiled from the works of Robert B. Abbott, noted metallurgical engineer and member of the Society of Automotive Engineers, and is so written as to be easily understood by the average reader.

HEAAT treatment of steels is not new, but has been in use for ages in the tempering and hardening of metals. The ancients were familiar with its processes as relating to the preparation of steel for implements of warfare. In later years it has been used extensively by the village blacksmith in making and fitting steel shoes to horses, wagon tires and other metal parts required in body building and wheelwright work. His knowledge of the subject was necessarily limited and was more of a rule-of-thumb

method, usually handed down from father to son.

It is only of late years that the proper attention has been given to the study of this subject in universities, and research work is now carried on extensively in the engineering laboratories of the leading automotive manufacturers. Each day sees some new idea advanced which tends to show that men who have given the greater part of their lives to this subject are only now beginning to enjoy some of the results of their labors.

The heat treatment of steels has been brought to a high state of perfection during the last few years through the search for metals that would stand the hard usage necessary in passenger car, truck and tractor service, and the increasing use of these vehicles has created a demand for the best metals that could be supplied; metals of sufficient hardness to stand up and take the wear and tear without showing any appreciable effects and that would not crystalize or break readily in service. Metallurgical experts assert that the end is not yet in sight in the treatment of metals used in this industry and that as the years pass still greater improvement may be noted in the grade of metals used.

An alloy is a liquid or a solid substance composed of two or more substances, one at least of which is a metal. Steel is an alloy which in its simplest form is made up of two components, the metal iron and a chemical compound known as "cementite," consisting of carbide of iron. Sulphur, phosphorus, manganese and silicon are always present in commercial steel, but the carbon is the main factor in producing variations in the physical properties.

Heating the ordinary alloy up to the melting point causes no important changes in the components. With steel this is not true. Take an ordinary machine steel of the following composition (in per cent.):

Carbon	0.200
Phosphorous .....	.025
Sulphur .....	.030
Manganese .....	.600
Silicon .....	.150
Iron	98.995

From this cut several test bars and carefully anneal them. A tensile test of one of these bars gives approximately the following results:

Tensile strength, pounds per square inch	55,000
Reduction of area, per cent.	65

In general the reduction of area is a fair measure of the toughness of the steel. Therefore, without any serious error, we can consider the percentage of reduction to represent the percentage of toughness. The elongation has usually been taken as a measure of this property, but it is not nearly so reliable as is the reduction.

Taking a second test bar, heating it in a furnace to a temperature of 500 degrees Fahrenheit and quenching or cooling it in water, it will be found that the physical properties have not been altered. Quenching from a temperature of 1000 degrees will give the same results. In short, it is found that no physical change can be produced in steel if we quench from any temperature until we reach approximately 1375 degrees. The bar quenched from this and higher temperatures will show physical properties similar to those given in Table I. If we use temperatures higher than 1625 degrees the change in the physical properties will be slight.

It is evident from a study of Table I that some important change has taken place in the steel at a temperature of 1375 degrees and also at about 1565 degrees. The change at 1375 degrees is a sudden one, while the second change is a progressive one, reaching its maximum at 1565 degrees. These are known as critical changes and the temperatures at which they take place are known as critical temperatures. The entire range be-

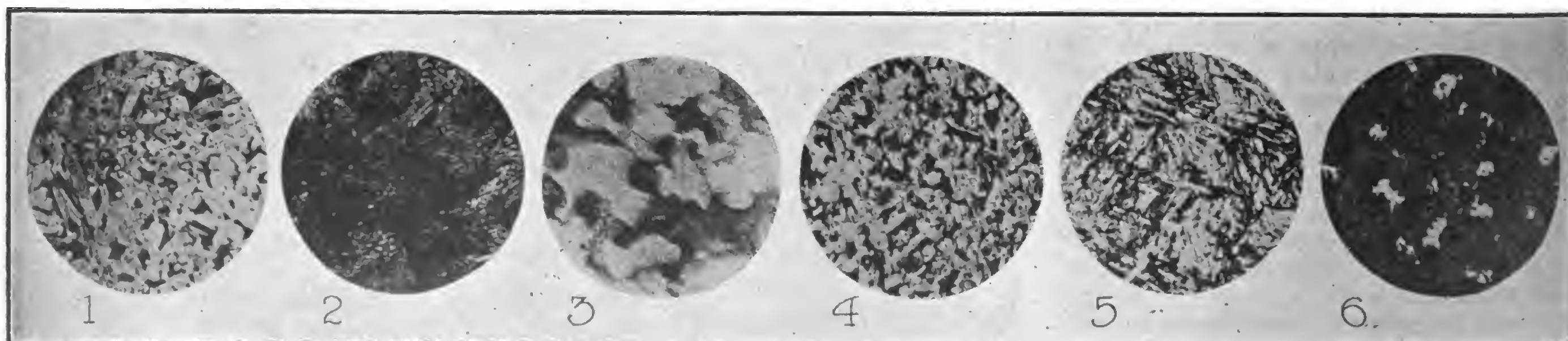


Fig. 1, Untreated Specimen of 0.20 Per Cent. Carbon Steel, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 2, Same Specimen as in Fig. 1, Magnification 1200 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 3, Martensite, Pearlite and Iron Quenched from 1375 Degrees, Magnification 1200 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 4, Martensite and Iron Quenched from 1440 Degrees, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 5, Same Specimen as in Fig. 4, Magnification 1200 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 6, Martensite and Iron Quenched from 1525 Degrees, Magnification 150 Diameters, Reduced About 25 Per Cent.

tween these two temperatures is known as the critical range.

Studying Steels Under the Microscope.

If various samples of steel are closely examined under the microscope additional information can be obtained regarding the nature of the change that takes place in the critical range. Figure 1 shows the appearance of the untreated steel under the microscope, magnified 150 diameters. The white material is the pure iron. The black area consists of an intimate mechanical mixture of cementite and iron. This mixture is known as pearlite and is always uniform in chemical composition. A still higher magnification of 1200 diameters, Figure 2, shows this mixture.

The steel quenched at 1375 degrees shows but a slight change under the 150-diameter magnification. On examining the pearlite, however, under 1200 diameters, we find that it no longer consists of a mechanical mixture of cementite and iron, but that the two have apparently dissolved into each other, resulting in a homogeneous material. This is known as martensite and is the main constituent of hardened steel. Figure 3 shows this martensite during the process of formation.

Table I—Properties of Heat-Treated Bar.

Quenching Temp. Degrees Fahr.	Tensile Strength Lbs. Per Sq. In.	Reduction of Area Per Cent.
1375	95,000	30
1425	97,000	35
1475	99,000	43
1525	102,000	50
1565	105,000	55
1625	104,000	50

Upon examining steel quenched at 1440 degrees as shown in Figure 4, in which martensite has increased in amount and the iron has decreased, what has really happened is that the higher temperature has increased the dissolving ability of the martensite for the iron and therefore more of it has been dissolved.

Examining this martensite under magnification, Figure 5, 1200 diameters, its characteristic appearance, which is a needle-like structure, shows the crystals being arranged at angles of 60 degrees to one another. Figure 6 is the sample quenched from 1525 degrees. Here the iron has nearly disappeared. At about 1565 degrees the iron will have entirely dissolved and the steel will consist of martensite only. This is shown in Figure 7 under a magnification of 150 diameters.

As the quenching temperature rises we find no further change except a coarsening of the crystals.

All steels have two important temperatures or critical points. At the lower point the pearlite fuses together, while at the upper the absorption of pure iron by the fused pearlite is completed. The lower or first temperature is not affected by the amount of pearlite present and, since the amount of pearlite depends upon the amount of carbon, this is equivalent to saying that the lower critical temperature is independent of the carbon content. As the carbon content of the steel increases, the amount of the pearlite is correspondingly greater. Consequently the amount of iron left to be dissolved by the fused pearlite is smaller and the temperature necessary to get this into solution is lowered. The lowering of the upper absorption or critical point, because of the increased carbon content, continues until at about 0.9 per cent. carbon nothing but pearlite is present; consequently the two temperatures of change coincide.

As the carbon content increases above 0.9 per cent. the excess cementite can no longer exist as pearlite, since there is no more iron for this purpose. Consequently it must exist alone. Cementite is ordinarily glass-hard and extremely brittle. The cementite of the pearlite has this hardness and brittleness modified on account of its finely divided condition and its mixture with the soft ductile iron. As soon as the cementite has no more iron with which to mix, it occurs in large crystals, either traversing the material in flat sheets or surrounding large crystals of pearlite like an envelope. In either case it causes extreme brittleness.

Upon raising the temperature of the steel sufficiently high the fused pearlite finally dissolves all the iron and the final substance is martensite. Evidently then the martensite has a different composition, depending upon the original problem content of steel.

Martensite with a high-carbon content is extremely hard, while one with a low-carbon content is comparatively soft. A piece of hardened tool steel consists of a high-carbon martensite, while a heat-treated piece of ordinary steel consists of a low-carbon martensite, their appearance under the microscope being similar.

A steel containing more than 0.90 per cent. carbon has an excess of cementite. This dissolves in the fused pearlite, as

the temperature is raised, in the same manner that the excess iron did in the low-carbon steel.

Required Qualities for Gear Steel.

Gears, such as are used for driving or transmission in an automobile or truck, must be extremely hard. At the same time they must have a high degree of toughness or resistance to shock, this being particularly true of transmission gears. A low-carbon heat-treated steel is ideal as far as toughness is concerned, but it is not hard enough to resist the wear. A high-carbon hardened steel is ideal as far as wear is concerned, but it is too brittle to withstand hard usage.

This difficulty has been partly overcome by the use of a steel containing an intermediate amount of carbon, about 0.50 per cent. Upon heat-treating a steel of this sort, particularly when some extra alloying elements, such as nickel or chromium are present, it will give a fair degree of wear and toughness.

A Better Method.

A better method, but one frequently not productive of the best results because of lack of correct treatment, consists in the use of a low-carbon steel that is surface case-hardened. Figure 1 shows such a steel, the use of which is theoretically ideal where hardness and toughness are required; its use can be made ideal from a practical standpoint as well by correct heat treatment.

Suppose we start with a 0.20 per cent. carbon-steel gear blank which is easily machined. Packing it in carbonizing material will produce a high-carbon or tool steel surface to any depth desired, say of an 1/32 inch. In general this surface will contain a zone of carbon in excess of 0.90 per cent. at the surface and therefor contains cementite in excess of that necessary to form pearlite. Below this zone will be a zone of 0.90 per cent. carbon steel containing neither iron nor cementite in excess of the pearlite ratio; below this the carbon will grade down to the percentage of the original steel.

After the carbonization is completed the usual method consists in slow cooling in the carbonizing box. The structure of the surface is then like Figure 8. The outer surface consists of pearlite broken up by sheets or envelopes of brittle, but hard cementite. Next is a zone of pure pearlite and then a zone of pearlite and iron, the iron of which gradually increases to the composition of the steel.

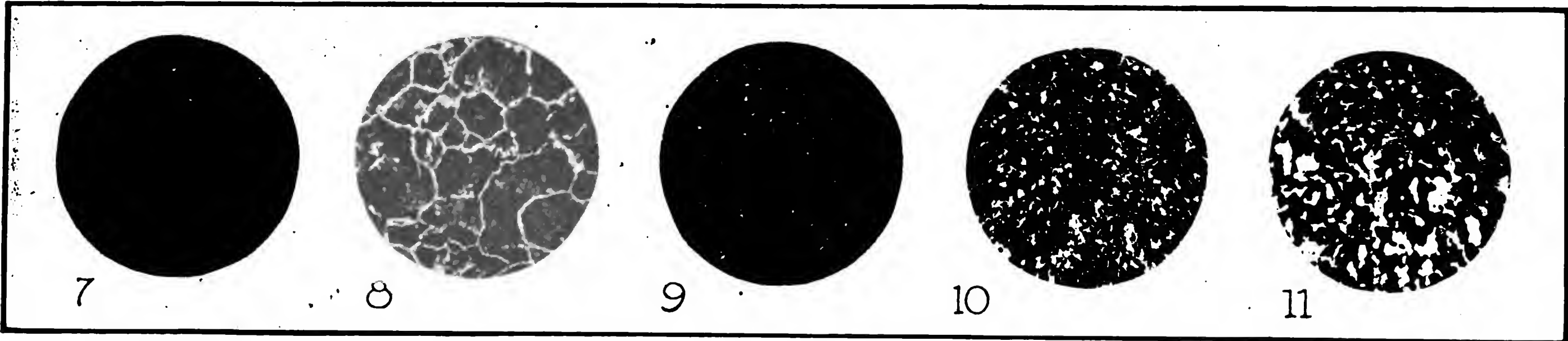


Fig. 7, Martensite Quenched from 1565 Degrees, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 8, Cementite and Pearlite After Carbonization, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 9, Cementite Globules in Case, Quenched from 1575 and Then from 1380 Degrees, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 10, Core of Carbonized Steel Quenched from 1575 and Then from 1380 Degrees, Magnification 150 Diameters, Reduced About 25 Per Cent. in Reproduction; Fig. 11, Core of Carbonized Steel Quenched from 1380 Degrees, the Magnification Is 150 Diameters, Reduced About 25 Per Cent. in the Process of Photographic Reproduction.

Changes at Ordinary Temperature.

Hardening this gear at the ordinary hardening temperature—that is, just above the lower critical point—all of the pearlite of the different zones will change to martensite, and the appearance under the microscope under low magnification will be about the same as that of the unhardened steel. A higher magnification will show, however, that all of the pearlite has been changed into martensite. The outer zone will then consist of a hard and more or less brittle high-carbon martensite traversed by a net of extremely brittle and hard cementite. The next zone will appear the same except that the cementite will be lacking. Below this the material will be a mixture of martensite and an increasing amount of iron. A gear treated in this manner will not show a high efficiency; the surface will be brittle, because of the cementite net work. The core will not have its maximum toughness, as it has been quenched from just above the first critical point.

Quenching from a temperature above the upper critical point (1565 degrees) will give a much higher degree of toughness from the core and at the same time cause the cementite of the case to go into solution (provided the final solution temperature of the cementite of the case is below the final solution temperature of the iron of the core, which should be the condition of affairs). Then the entire gear will be martensite, starting with a high-carbon martensite at the surface and reduced to a low-carbon martensite at the core.

Three disadvantages are found in this method of treatment: First, the hard wear resisting cementite of the case is not present; second, the core, while better than that produced by the first method, is not in the best possible condition; third, the high temperature necessary for the solution of the cementite of the case has caused a coarse crystalline structure to be formed that has disadvantages which are open to argument.

Best Method of Heat-Treating Steel Gears.

The best method consists of first treating at the high temperature as just described and then reheating at just above the lower critical temperature. Under these conditions the first quench has left the entire gear in the martensite condition. Upon quenching the second time from just above the lower critical temperature we would expect to get the same constituents as when quenching from the first time from just above the lower critical temperature; that is, cementite and martensite in the outer zone, martensite in the second zone and martensite and iron in the balance. This is what we do get, but the structural arrangement is entirely different.

The cementite of the case, instead of coming out in a net work, which represents a growth of crystallization during cooling, is now precipitated in minute globules from innumerable points. This is an ideal condition for maximum toughness corresponding to maximum wear. The entire amount of excess cementite, the hardest constituent known to steel, is

present. It is not in the form of a net work or in sheets, which will cause brittleness both because of their own large masses and on account of their tendency to break up the continuity of the hard martensite, but exists as globules, Figure 9, that give a maximum wearing surface compared to their volume.

Examining the core we find a similar condition. The iron and martensite, Figure 10, instead of forming large masses as when a single quench from above the lower critical temperature was used, Figure 11, now exist as a more or less homogeneous fiber-grained mass, which is in the best possible condition to resist fracture. In this condition its toughness is greater than if quenched from above the upper critical temperature. Evidently an extremely important point in carrying out this treatment is to quench from the lowest possible temperature above the lower critical or hardening point. A small range in temperature for this quench represents an enormous difference in physical properties, particularly with a deep case.

This is due to the fact that directly above the lower critical temperature the iron and martensite precipitate out in the finest possible state of division. As the temperature is raised each of these elements starts coalescing into larger masses. The iron also dissolves again into martensite. For the best results in carrying out this operation a lead furnace for heating and a resistance pyrometer of a high degree of accuracy are desirable.

Tempering or Drawing Steel.

This method is merely to produce a little less brittleness at the expense of some of the strength. If we treat the steel and get too much brittleness and hardness we can increase the toughness by a second heat at a low temperature so that we can get a little more toughness at the expense of hardness. Many gear manufacturers, whether they quench once or twice, draw their gears, particularly their clash gears. If the steel from which the gear is made is right at the beginning, if the first quenching temperature is above the upper critical temperature of both the case and the core and if the second quenching temperature is just above the lower critical temperature, it is not necessary to draw. But if the pyrometers or the temperatures are not right, it is frequently necessary to draw, especially clash gears.

The hardness of steel is a direct function of the strength and the latter is a function largely of the carbon content. A plain carbon steel is practically as strong as the highest type of alloy steel, but its brittleness is so great that it is impossible to take advantage of its strength. The chief advantage of alloy steel is that with a given degree of strength it has more toughness.

Carbonizing Treatment.

After the steel is placed in the carbonizing material the boxes are sealed with clay around the top, and if they leak it does not matter. As a matter of fact, all of the boxes leak because clay soon dries out with the heat and cracks. The leakage cannot be prevented, because the process of carbonizing produces gases all

the time the box is in the furnace, and they must escape.

The absolute temperature of the resistance instruments are seldom checked on this work. These instruments frequently are 10, 15 or 20 degrees in error. This error increases as the instruments grow older because of the platinum volatilizers, the wires become thinner, their resistance is greater and the temperature (as indicated by the instrument) is higher. The best results are obtained as follows: Each morning the man who is working on the furnaces is provided with several test bars that are packed with the material with which he is working. He knows that the hardening temperature for his instrument will be about 1290 degrees for nickel steel and that it changes slowly; he also knows from day to day what this hardening temperature is. He quenches a test bar at 1289 degrees and finds that it will not harden. He tries 1290 degrees, and finds that it will harden at 1291 degrees and uses this temperature for that day.

Lead baths are used entirely for this work as an open furnace could not satisfactorily be employed and get the temperature within one or two degrees. It is not necessary that the actual temperature of the furnace be known, as all that is required, is a check each morning. When the instrument is 25 or 30 degrees high the resistance bulbs are changed for new ones.

Fire clay is used so that the carbonizer will not burn the top of the boxes.

Time Element in Heat Treatment.

In figuring the lowest temperature that can be used and the shortest time within reason for softening a so-called hard steel, a rise of three degrees means more than three hours' time after a certain point is reached because the temperature is far more important than the time element. One argument given against the fact that time (beyond a second or two) has anything to do with heat treatment is that hardened pieces of steel have been found in the Pyramids. They are file-hard today and the temperature at the Pyramids has been fairly high at times. If they have not softened in that time at temperatures around 130 degrees, it is impossible to expect to work at these low temperatures within a reasonable length of time. After a piece of steel is thoroughly heated, time does not affect its commercial heat treatment.

Slow drawing back in heat treatment makes no appreciable difference as shown by careful experimentation. One experimenter took 100 test bars, quenched them from the upper critical temperatures and then drew them back and put them in a bath that held five tons of lead. He next heated this slowly, bringing the bars to different temperatures, took out two at 750 and two more at 755 degrees, and so on up to 1000 degrees, quenching one in water, cooling the other in air, and then made them all standard test bars. The hundred test bars showed no appreciable difference in strength. Making only a few tests the impression might be given that the quenching was bad, but the strengths of the 100 test bars were so nearly the same that the differences were negligible.

THE present trend of foreign markets for American automotive vehicles, as indicated by October shipments, is shown in the following table.

Automotive Markets as Indicated by October, 1921, Exports.

Countries of Destination.	October, 1920.		September, 1921.		October, 1921.		Unit Value.
	Number.	Value.	Number.	Value.	Number.	Value.	
Passenger Cars. ¹							
Mexico	410	\$338,455	507	\$398,145	625	\$366,368	\$568
Australia	902	1,053,128	334	313,828	274	221,128	807
Canada	229	321,568	339	378,765	241	321,432	1,334
United Kingdom	1,019	1,220,595	19	21,691	221	127,209	575
Japan	163	252,228	211	103,807	117	64,840	554
British South Africa	531	584,778	40	50,548	83	96,296	1,160
British India	968	1,180,787	56	64,160	76	77,301	1,017
Other countries	7,340	9,747,863	891	539,826	692	678,067	980
Total	11,562	14,699,402	2,197	\$1,870,770	2,329	\$1,952,641	838
Motor Trucks.							
Mexico	123	219,613	72	51,031	177	70,508	398
Brazil	(²)	(²)	2	2,200	75	283,750	3,783
Canada	76	146,189	95	117,000	68	105,793	1,556
Netherlands	(²)	(²)	18	15,483	60	51,309	855
United Kingdom	276	317,575	54	79,674	53	58,527	1,104
Japan	36	50,059	102	55,256	50	25,000	500
British Oceania	54	108,026	13	24,428	21	36,715	1,748
Other countries	1,870	3,183,699	116	136,592	91	123,494	1,357
Total	2,435	4,025,161	472	481,664	595	755,096	1,269

¹ Excluding parts.

² Not separately stated prior to 1921.

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cline in May with a falling off of 56 per cent., but have been gaining since. This tendency toward improvement has not been a regular one, however, and the month of October, 1921, witnessed a new set back with a decrease of 54 per cent. from the 1920 figures, which is only two per cent. better than May.

The decrease in automotive exports for the 1921 period, compared with that for 1920, was considerably more pronounced than the decrease in total exports, the average for the nine months, January to September, being 71 per cent., as against 43 per cent., and while the total exports began to improve again in June the decrease in automotive exports was still growing in July, when it amounted to 83 per cent. The September figure (78 per cent.) and October figure (79 per cent.) seem to indicate that automotive exports, too, have turned the corner and that we are on the eve of more promising developments. It is, however, not impossible that seasonal fluctuations will interfere with the improvement now noticeable.

British Market Depressed.

While American manufacturers cannot expect to sell motor vehicles in Great Britain in the immediate future, according to a cablegram from Commercial Attache W. S. Tower, London, the prospects are not any better just now for the British manufacturer in his own market, as

the demand for motor vehicles is negligible.

The value and quantity of motor vehicles, parts and chassis included, imported

MAY BAR HORSES.

A RESOLUTION proposing the exclusion of horse-drawn vehicles from certain streets in the business district, and requesting the Ordinance committee to investigate, recently was presented in the Common Council of Providence, R. I., by Councilman Asa Cushman, and adopted. The resolution proposes that these vehicles be excluded from the several streets bounded by and including Empire and Weybosset streets, Turks Head, Westminster, Dorrance and Washington streets, between the hours of 10 a. m. and 7 p. m. on week days, except by special permission of the Police department.

ed into Great Britain during the first 10 months of 1921 declined approximately 75 per cent. as compared with the same period of last year; exports dropped 50 per cent. The depression in the market has resulted in an almost complete stagnation in the British automotive industry. Prospects for immediate revival are nil, due to foreign competition and high prices for the British products, heavy cost of gasoline, government taxes on horsepower and general business depression.

The average plant in Great Britain employs, in normal times, between 500 and 1000 operators and turns out from 500 to 600 cars a year. Austin advertised a production of 5000 cars last year as the largest one on record in Great Britain. In some plants, electric lighting sets, stamped steel beds, air plane motors and marine equipment are manufactured in addition to automobiles. One case is known where the manufacture of automotive products is merely a side line.

Italian Automobile Manufacturers Active.

"American automobile manufacturers, especially of low-priced cars, will have to meet considerable competition on the part of Italian manufacturers," says Commercial Attache H. C. MacLean at Rome.

The Ansaldo Co. which, during the war manufactured war material solely, including guns, armored cars, war vessels, etc., is turning out small, popular passen-

PROPORTION OF AUTOMOTIVE EXPORTS.

THE proportion of automotive exports (excluding motorcycles and air planes) to total exports from the United States for the first 10 months of 1920 and 1921 is shown in detail in the tables following: Total Exports from United States, January to October, 1920 and 1921.

Months.	1920.	1921.	Per Cent. of Increase (+) or Decrease (—).
January	\$722,063,790	\$654,271,423	—09
February	645,145,225	486,454,090	—24
March	819,556,037	386,680,346	—52
April	684,319,392	340,364,106	—50
May	745,523,223	329,709,579	—56
June	629,376,757	336,898,606	—46
July	651,136,478	320,706,290	—51
August	578,182,691	371,935,299	—36
September	604,686,259	325,713,702	—46
October	751,211,370	346,000,000	—54
Total	6,831,201,222	3,898,307,733	—43

Automotive Exports¹ from United States, January to October, 1920 to 1921.

Months.	1920.	1921.	Per Cent. of Increase (+) or Decrease (—).
January	\$16,353,382	\$19,089,467	+17
February	22,974,489	8,544,423	—63
March	29,027,355	6,314,498	—78
April	26,028,921	6,938,808	—73
May	29,675,019	6,972,756	—76
June	26,132,052	4,800,252	—82
July	25,049,385	4,140,130	—83
August	23,280,892	4,486,266	—81
September	22,897,775	4,923,294	—78
October	25,635,101	5,409,739	—79
Total	\$247,054,371	\$71,629,427	—71

¹ Excluding motorcycles and air planes.

ger and commercial cars. These cars, while not having the pretensions of well-known Italian makes, are to combine the advantages of a convenient price and low running cost and up-keep. The four passenger touring car sells f. o. b. factory at 30,000 lire, chassis without body (\$1185 at exchange rate on Oct. 21, the date of the commercial attache's letter), and 42,000 lire, chassis with body (\$1659).

Details are on file in the Automotive division of the Bureau of Foreign and Domestic Commerce and will be furnished on request by referring to Exhibit File No. 49,255.

The Fiat Co. is gradually returning to normal working conditions, according to the Agenzia Economic Finanziaria, dif-

ficulties with the personnel having been overcome. During August 600 automobiles were turned out, 800 during September and 1000 were planned for October, all of which have already been sold. The warehouses of the company are practically empty, there being only 200 motor trucks on hand, and these are expected to be readily absorbed by the domestic market. The construction of commercial cars will be suspended during the coming year.

Difficulties in the Spanish Truck Market.

American manufacturers have come to realize the necessity of offering more liberal credit terms in Spain. However, in spite of accommodating dealers with terms of one-third with order and c. i. f. charges cash against documents, one-

third at three months and balance at six months, there seems to be little prospect of selling trucks, as there is at present an excess of commercial vehicles in the market. French and other continental houses are shipping trucks as well as touring cars to dealers on deposit, without any cash payment or bankers' credit. **British East Africa a Potential Market.**

American automotive manufacturers who are cutting down their export organization more than absolutely necessary make a grave mistake. Business in most parts of the world is still depressed and the demand for motor vehicles, therefore, small; but as soon as general conditions improve automotive products will again sell, as the potentiality of markets abroad is almost unlimited.

Nairobi, Colony of Kenya, Africa, serves as an illustration. As money is tight at present and goods move slowly, the demand for motor trucks is small. The market is potential, however, as there is only one railway running from the coast to Lake Victoria through a very rich and productive country, and this railway is fed by the slow and costly means of ox transport.

In Uganda there are no railways and transportation depends on animals and motor vehicles. People are thus interested in motor truck transportation.

WILL BUILD CAR.

Metropolitan Motors, Kansas City, Mo., will manufacture a light-weight, high-efficiency motor car and will shortly release contracts and orders for first lot of about 200 cars. About 100 will be equipped with a high-grade four-cylinder engine and the balance will have a six-cylinder motor. The wheelbase is 122½ inches and two tire sizes in cords, 33 by four and 33 by five, with wood, wire, or disc wheels as optional, will be standard equipment. Four body models, sedan, coupe, roadster and touring, will be furnished. The price will range from \$2500 to \$3500. The following officers are in charge of the company: President and general manager, Harvey D. Taylor; vice president and secretary, G. H. Clevidence; treasurer, Ross H. Rhelm; engineer and purchasing agent, Robert H. Campbell; secretary to the president, A. M. Feltenstein.

BETTER STATE ROADS.

PHILADELPHIA, PA., Dec. 12.—The Good Roads committee, in conjunction with other organizations in the work, has launched a movement that promises to be an important factor for the betterment of road conditions throughout the State of Pennsylvania. This was the launching of a movement to coordinate the activities of all of the commercial organizations in the leading Pennsylvania cities in a movement to check road construction and maintenance in cities and roads connecting various towns and cities.

General Secretary N. B. Kelly has started to arrange with the other organizations for the coordinating of this work. It is intended that the members of these organizations shall survey the work.



"Some of these so-called salesmen better get themselves a good, husky tin cup and a crutch," grunted O. M. Vett, as he slammed up the telephone receiver and turned to his desk. "That's about all they're good for."

"What prompts the outburst?" I asked, handing over the cigar for which he seemed to be searching his pockets.

"Feller just called me," nodding toward the telephone, "thinks he's a salesman. Been here a month on salary and commission—sent him out on a live tip this morning. Left the office 30 minutes ago. Now he telephones in the man says he don't want to buy a truck right now and I must have been mistaken!"

"What sticks in my crop is why these fellers claim to be salesmen when they can't sell. Can't call 'em order-takers either, since they don't take any orders."

"Their salesmanship reminds me a lot of the method followed by the foolish farmer boy. You know the story, I guess. It seems this farmer boy was sent by his father to market to sell a fat cow. Arriving at the market place he tied the cow in a stall and sat down to wait for buyers. The first man who came along stopped and looked the animal over.

"That cow ain't much good," he opined.

"No, she ain't," assented the boy.

"What price do you hold her at?" the buyer wanted to know.

"Well," said the boy, "Pa told me to offer her for \$50 and if I couldn't get the \$50 to take whatever was offered me even if it was only \$25."

"There's a lot more just like this lad running around with bags in their hands and bran in their heads trying to sell trucks. They could probably give 'em away—but they never could sell 'em in a million years," he explained, blowing through the cigar.

"Yes, sir, the name, 'salesman,' as applied to these fellers reminds me a lot of this 'Havana cigar,' you just gave me," he grunted, eyeing the weed with distrust.

"How is that?" I asked.

"Neither Havana nor yet cigar—but just a handful of dried cabbage leaves and glue," said Vett. "An 'odorous' comparison and a just one, too—if you ask me."

ROUGH DEMONSTRATION.

Autoists in the larger cities are familiar with the method employed by the Metal Stamping Co. of Long Island City, N. Y., to demonstrate its automobile bumper. Usually the driver runs his car against a

telegraph pole at a 15-mile clip, rebounds half-way across the street and then pauses while the idea sinks in that both the bumper and the car are uninjured. The telegraph pole is rarely taken into consideration.

A recent issue of the Willoughby, O., "Republican," tells of the experience of the Lyon Resilient bumper demonstrator in that town. The charge up the street was made in a spectacular manner. The pole was hit fairly. The bumper stood the shock. So did the car. But the telegraph wire broke and the pole slewed out of alignment. The demonstrator had to square up with the village for damage done before heading westward.

ARGENTINA ROADS GOOD.

BUENOS AIRES, ARGENTINA, Dec. 12.—Edward F. Feeley, the United States commercial attache at this point, announces that there is a growing interest in the value of serviceable highways throughout Argentina. The first national road congress is to be held in this city in May, 1922.

The three provinces of Buenos Aires, Cordoba and Mendoza particularly, have encouraged road building in the past. In the province of Entre Rios it is planned to connect the principal points with highways. Still another project which is likely to be undertaken in a relatively short time is the construction of a road connecting the cities of Buenos Aires, Rosario and Cordoba.

While little business can be expected at present, owing to the unfavorable exchange situation, Mr. Feeley says, it is advisable for American manufacturers of road-building machinery and commercial vehicles to place their literature before the Argentina road engineers. Correspondence of this nature should be addressed to President de la Comision, Primer Congreso de la Vialidad, Touring Club Argentino, Avenida de Mayo 761, Buenos Aires.

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car per gallon of gasoline used. Quite naturally this interest has reached the active stage because the importance of automotive operation costs is now more fully realized than formerly. Enormous quantities of gasoline are annually wasted by poorly designed or badly worn engines. Imperfect carburetion and faulty ignition are also responsible for much of this wastage.

The accompanying illustration shows the dispersion of energy from fuel as it passes through the engine of a high-class touring car travelling at a speed of 40 miles an hour on high gear. Each design of engine and car, of course, has a different energy diagram corresponding to the degree of efficiency attained at different speeds and loads.

The highest efficiency obtained in the best types of stationary internal combustion engines (Diesel) is about 35 per cent., which value has been approached within a few points only by the most modern high-speed automobile racing and aeroplane engines.

Dilution of the Engine Oil.

The chief cause of the dilution of motor oil in the crank case is known as being due to unburned gasoline working its way past the piston rings into the lubricant. When gasoline vapor comes in contact with lubricating oil it is absorbed by the latter and the body of the lubricant is reduced. If the piston rings are loose and the gasoline-air mixture is too rich, or if the engine is operated for long intervals with the choke closed, or the cylinders fire irregularly, the dilution will be rapid, necessitating changing the lubricant frequently.

Dilution is not only wasteful of the lubricating oil, but also of gasoline. It cannot be overcome by changing to a heavy engine oil; the mechanical defects should be remedied to prevent its occurrence.

Cost of Gasoline.

Examination of cost data on the operation of more than 500 trucks and 140 Ford cars that were studied in detail during the year 1919, shows the relatively low cost of gasoline to other operating expenses. In the instance of trucks of 1½ to five tons' capacity, it is found that the gasoline cost, charged at the prevailing commercial truck price, represents 10 per cent. of the cost of the total operation, which includes chauffeur's wages.

In the case of Ford cars, with no expense for chauffeurs, gasoline represents 17 per cent. of the total cost of operation.

The Future of Gasoline.

As the years go by motor vehicles will be built in increasing millions and the limit of their use is considered by many experts to depend wholly on the fuel supply, as specified by the production of gasoline. Two factors are of paramount influence: In the first place, men must have faith enough in the future to hazard the fruits of their lives' labors in the search of unexplored regions for more crude oil. Secondly, the ingenuity of another class of men must be devoted to the endeavor of obtaining more gasoline out of every barrel of crude oil that comes from the earth; in other words, evolving more complex and efficient refining methods. The refineries of the future will more than likely have to be rebuilt and supplied with new and far more intricate and costly, but better, equipment than any that has been conceived by the most progressive refiners of the present day. The quality of the product must remain satisfactory, changing only to conform with improvements in engine design.

It may be stated, in conclusion, that there is in sight no satisfactory substitute for gasoline that can be used to operate the millions of automobiles, motor trucks, tractors and stationary engines. No other fuel is produced in sufficient quantity. While much talk is heard of a scarcity of gasoline the optimist should have faith enough in the progressiveness and ingenuity of the men associated with its manufacture to believe that even though production difficulties may greatly increase, there will be no appreciable shortage of gasoline.

New York Chicago Shows Will Feature Good Values

Decorations, Exhibits and General Programme All Conducive to Make Annual Events of Unusual Interest—Record Number of Cars to Be Shown.

PREPARATIONS for the national automobile shows in New York and Chicago, which are rapidly nearing completion, assure those who have kept in touch with affairs that the displays will be the biggest and most comprehensive the country has ever known. The New York event, the first half of the show, will be held in Grand Central Palace, Jan. 7 to 14, and the Chicago event, the second half, in the Coliseum and Armory, Jan. 28 to Feb. 4.

S. A. Miles, manager of both displays, has been in New York for some days conferring with decorators for the Palace exhibition and, while he is not ready to divulge his programme in this respect, he promises it will surprise visitors. It is also known that automobile manufacturers throughout the country are cooperating from every possible angle to make the shows the greatest ever. This is reflected in the record number of exhibits promised.

One of the outstanding features of the 1922 show will be the great values in the cars displayed. Never before has a prospective automobile purchaser been offered as much for his money as he can now get. Ever since the war motor car manufacturers have been profiting by the lessons learned when the plants were being used by the government. As a result they have been able to reduce costs and at the same time show betterments in their products.

Automobiles surely are improving every year; the automobile shows reflect this. For the most part, however, the betterment has been noticed in body designs, coach work and finish, both interior and exterior.

There will be 94 car manufacturers exhibiting on the four floors of the Palace in January, as against 88 last year. This record number of exhibitors means that there will be nearly 400 different models shown to the New York motoring world; in fact, to those interested from all parts of the country, for New York City will surely be the mecca of the motoring enthusiast of the entire United States during the eight days of the show.

Eight new makes of cars, including two foreign, will be seen at New York. These are the Bournonville, Handley-Knight, Rickenbacker, Wills-St. Claire, Kelsey, Itala and Vauxhall. The last two named are the foreign makes that will be on display.

This year's New York exhibition will also show to the public the biggest display of accessories that has ever been located under one roof, in spite of the

fact that it was impossible to find space for many who applied for booths. In New York the accessory booths number

TIRE WARRANTY.

THE following standard claim form covering pneumatic automobile tire warranties has been approved by the Tire Manufacturers' division of the Rubber Association of America, Inc.:

"We do not guarantee pneumatic automobile tires for any specific mileage, but every pneumatic automobile tire bearing our name and serial number is warranted by us to be free from defects in workmanship or material.

"Tires claimed to be defective will be received only when all transportation charges are prepaid, and when accompanied by this company's claim form duly filled out and signed by owner. If, upon examination, it is our judgment that the direct cause of the failure of the tire to render satisfactory service is attributable to faulty material or workmanship, we will, at our option, either repair the tire or replace it for a charge which will compensate for the service rendered by the returned tire, based upon its general appearance and condition.

"Pneumatic automobile tires in which a substitute for air has been used, tires used when not inflated to the pressure recommended by us, used under loads in excess of those recommended by us, used on wheels out of alignment, abused or misused, used on rims other than those bearing these stamps (), (), (), or which have been injured through accident or design, are not subject to claim hereunder.

"This company does not authorize any dealer or agent to make any other or additional 'guaranty' or 'warranty.'"

233, and they will show a most varied line of devices and appliances that go to help the motorist. Every year something new can be depended upon from this phase of the exhibit, this branch of the trade having grown to vast proportions in past few years and being considered no longer of secondary importance.

One of the features of the show week will be the many meetings, both business and social. These have not been all arranged and cannot be mentioned in detail as yet, but it is certain that the Old Timers' club, composed of men who have been in the automobile trade since its infancy, will have one of the big parties of the week.

The following cars will be seen at the New York show:

Ambassador, Anderson, Apperson, Auburn.

Bournonville, Buick.

Cadillac, Case, Chalmers, Chandler, Chevrolet, Cleveland, Cole, Columbia, Commonwealth, Crow-Elkhart.

Davis, Detroit Electric, Dixie Flyer, Dodge Brothers, Dorris, Dort, DuPont, Durant.

Earl, Elcar, Elgin, Essex.

Franklin.

Gardner, Grant.

Handley-Knight, Hanson, Hatfield, Haynes, H. C. S., Holmes, Hudson, Hupmobile.

Itala.

Jackson, Jordan.

Kelsey, King, Kissel Kar, Kline Kar.

Lafayette, Leach-Biltwell, Lexington, Liberty, Lincoln, Locomobile.

McFarlan, Malbohm, Marmon, Maxwell, Mercer, Milburn, Mitchell, Monroe, Moon.

Nash, National, Noma.

Packard, Paige, Paterson, Peerless, Pierce-Arrow, Pilot, Premier.

Rauch-Lang, R & V Knight, Reo, Rickenbacker, Roamer.

Saxon, Sayers, Standard, Stanley, Stearns-Knight, Stephens-Moline Plow Co., Stevens-Duryea, Studebaker, Stutz.

Templar.

Vauxhall, Vellie.

Westcott, Wills-St. Claire, Willys-Knight.

All of these cars will be displayed at Chicago also with the exception of the DuPont, Kline, Ambassador, Noma, Leach-Biltwell, Hatfield, Bournonville, Essex, Rickenbacker, Kelsey, Itala, Vauxhall, Stanley.

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